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THE LIVESTOCK INDUSTRY

OF

NICARAGUA

by

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THE LIVESTOCK INDUSTRY OF NICARAGUA

Since before Gil González de Ávila, the first Spanish conqueror, set foot on the shores of the great inland sea of Cocibolca (Indian name of Lake Nicaragua) in 1552 (3),[1] *Nicaragua has been one of the chief food-producing areas of Central America. The city of Granada, founded in 1524 by Hernández de Córdoba, at the head of Cocibolca, continued to be one of the commercial capitals of Central America until the construction of the Panama Canal. Until recently a small fleet of shallow-draft, ocean-going vessels carried products of Nicaragua and other countries of Central America to Europe in Nicaraguan bottoms via the lake and the Rio San Juan.*

SCOPE OF INDUSTRY

Compared with that of the United States, Argentina, Australia, etc., Nicaragua's livestock industry is indeed small, but in terms of its value as a national resource it looms large in the economy of the country. Prices used in evaluating the livestock and poultry have been arbitrarily set as follows: Cattle C$100 ($20) per head; horses, mules, and asses C$150 ($30) per head; swine C$50 ($10) per head; sheep and goats C$10 ($2) per head; and poultry C$2.50 ($0.50) per bird. These prices have been used as a result of study of price levels over several years and through discussions with various stockmen of the country. Under present conditions, they are believed to be rather conservative.

This is the first time that such a breakdown of classes of livestock has been used in evaluating Nicaragua's livestock industry in attempting to establish its place in the national agricultural economy. It may provide a basis at a later date for studying long-time trends in this field. (See table 1 and figs. 2-6.)

FIGURE 1. — The land entrance of the cooperative United States-Nicaragua Agricultural Experiment Station.

The writers wish to express appreciation to all those in Nicaragua who furnished information or who in any way contributed to this report. They are also grateful to members of the U. S. Department of Agriculture for helpful criticism and other assistance. Special acknowledgement is made to R. G. Hainsworth of the Economic Geography and Resources Section of this Office for his many valuable suggestions as to the presentation of charts and tables and to his staff for the work done in this connection.

Hope is expressed that the information contained herein may contribute to a better understanding between the stockmen of our two countries.

[1] Italic numbers in parentheses refer to Literature Cited, p. 49.

FIGURE 2. — Of the total value of farm livestock and poultry in Nicaragua, Chontales accounted for about $4,950,000; Chinandega, $2,766,000; Madriz, $2,125,000; and Rivas, about $2,063,000.

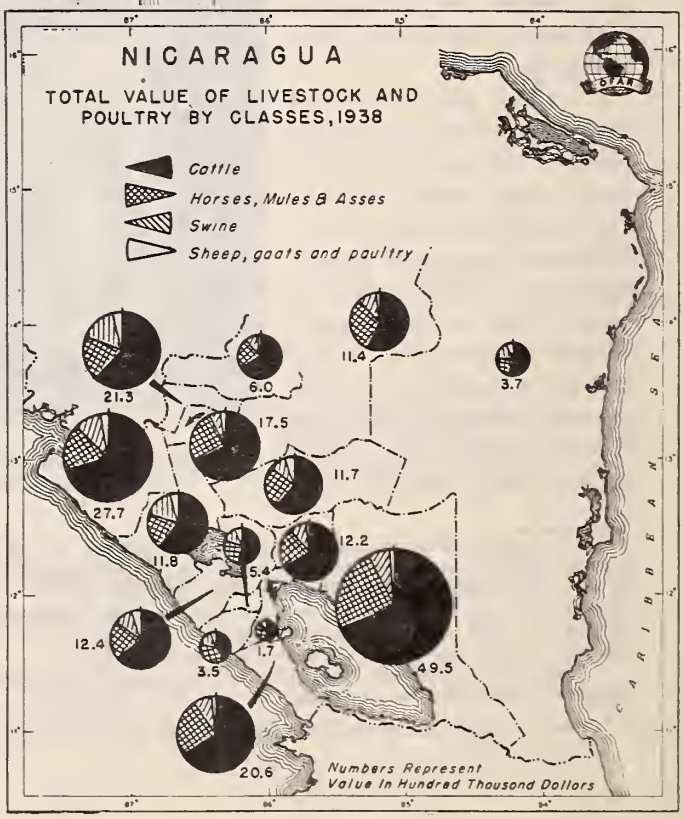

FIGURE 3. — In every Department, except Carazo, cattle account for more than 50 percent of the total value of all livestock and poultry. Even in the coffee-producing Departments of Carazo, Jinotega, Masaya, and Matagalpa horses, mules, and asses comprise 24 to 37 percent of the total value of animals. The percentage of value due to swine is highest in Zelaya, where coconuts are used to fatten them. Carazo, León, and Madriz also have more than 18 percent of the total value represented by hogs.

TABLE 1. - *Summary of livestock in Nicaragua, number and farm value, 1938 census*

CLASS	LIVESTOCK	FARM VALUE
	Number	*Dollars*
All cattle	697,128	13,942,560
Horses, mules, and asses	164,086	4,922,580
Swine	222,706	2,227,060
Goats	5,332	10,664
Sheep	14,558	29,116
All poultry	1,009,490	504,745
Total	---	21,636,725

When the value of the lands used for animal production is also included, the writers estimate that a little more than one-fourth of the agricultural wealth[2] of the country is derived from livestock husbandry in its various phases. Some livestock are produced in every Department of Nicaragua. Demands for dairy products are increasing, and more attention is being given to sound production practices. For those regions lacking good roads, increased attention is being paid to cattle production from the standpoint of supplying beef.

Production of poultry on a commercial scale is insignificant, but interest therein is growing. Though the intensive production of hogs is limited by available feeds, some small beginnings have been made, since the demand for the meat and particularly for the lard is great. Thus, this report is an attempt to give a picture of the industry as it has been observed through 2 years of residence and study in the country.

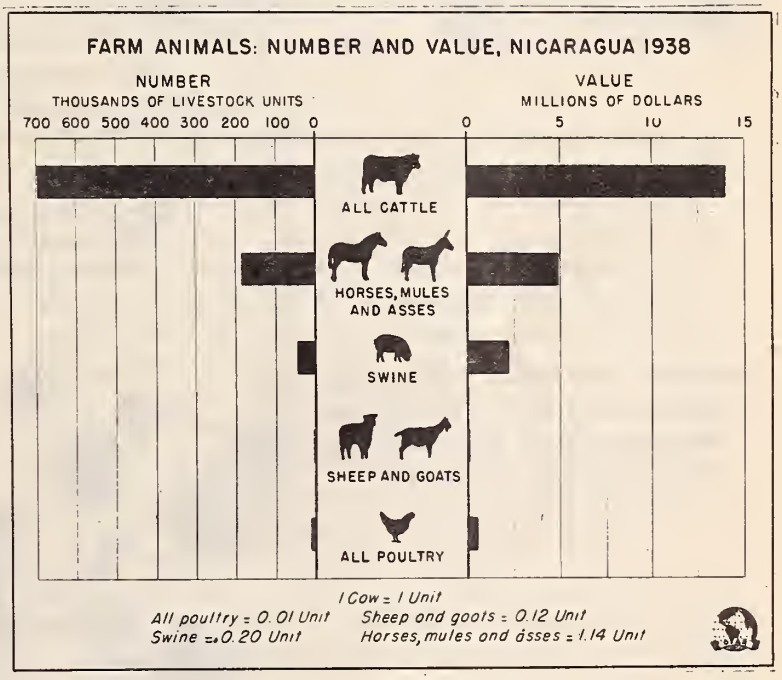

FIGURE 4. — Cattle constitute 697.1, or 74 percent, of the 941.04 total animal units in the 1938 census. Horses follow with 187, or 19.9 percent, of animal units. In value, cattle account for 64 percent of the total and horses and mules 22.7 percent.

[2] SMITH, JULE B. ANNUAL ECONOMIC REPORT - NICARAGUA 1943. U. S. Cons. Rpt. No. 37, 34 pp., illus. Managua. March 16, 1944. /Hectographed./

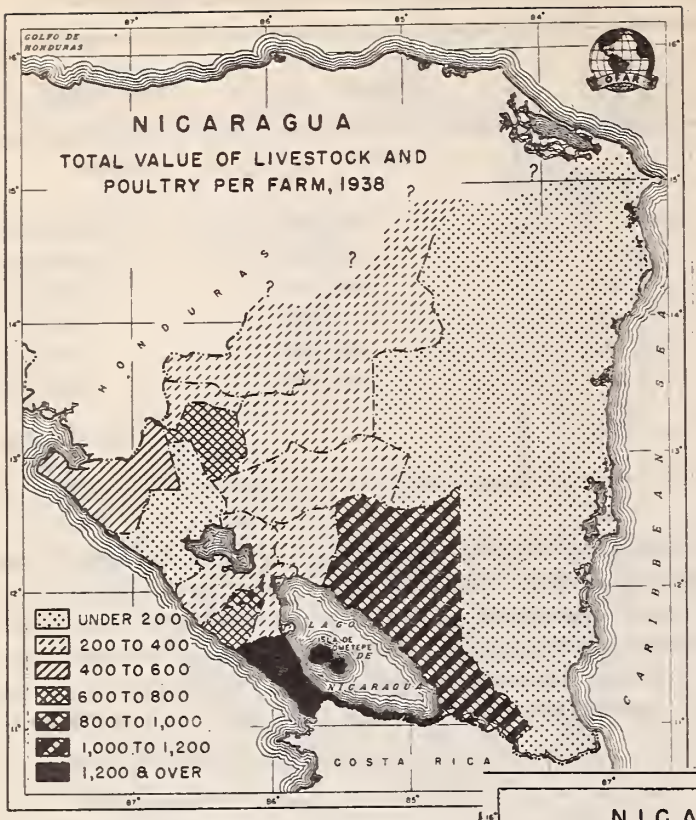

FIGURE 5. — The Departments of Rivas, Chontales, and Masaya lead in the total value of all livestock and poultry per farm. A larger number of strictly dairy cattle are found in Rivas and Masaya than in Chontales.

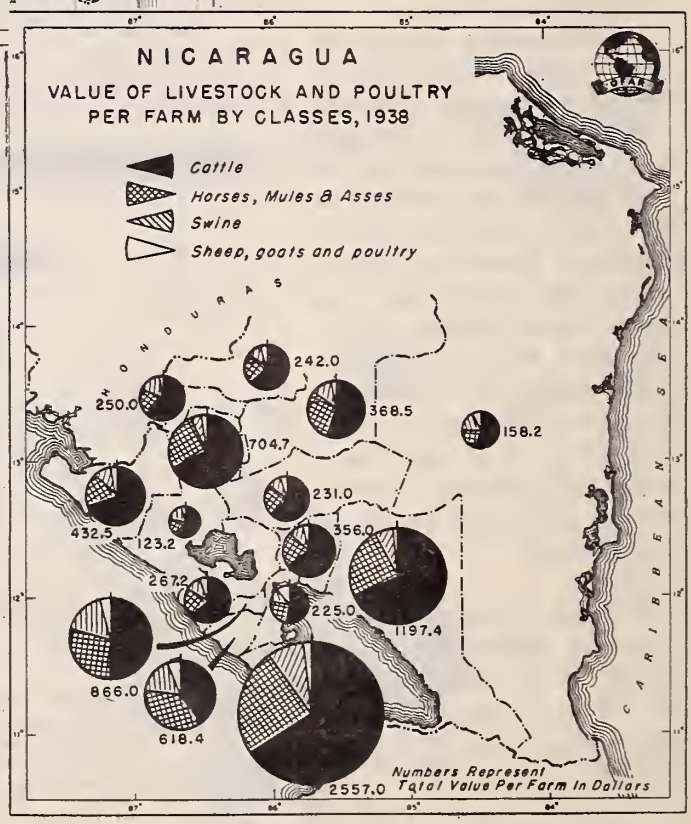

FIGURE 6. — In Rivas, the average value per farm of all livestock and poultry is greater than that of any other Department in Nicaragua.

GEOGRAPHY OF LIVESTOCK REGIONS

Climate and Rainfall

In the principal livestock-producing sections of the country, climate and rainfall are such that the problems of dry-season feeding are as serious to the Nicaraguan stockman as those of the winter season are to his counterpart in the United States. At elevations below 1,000 feet, along the coast and in the interior, the temperature is usually high throughout the day, frequently reaching 90° F., but is much lower and quite comfortable during the night. As long as the trade winds blow, this, or higher temperatures, is not oppressive, except when the humidity is high. At elevations above 2,000 feet, temperatures approach those of the spring and fall in the Temperate Zone, rarely exceeding 80° F. The nights may become quite cool and, in the rainy season, raw so that for exceedingly young animals shelter may be advisable.. At Managua, in the inland basin, the amount of rain may vary from 25 to 70 inches.[3] In general, this is typical of the precipitation in the western area.

Rainfall is heavier on the Atlantic side of the country than it is on the Pacific side. For instance, there may be 150 inches of annual rain at Bluefields at the mouth of the Río Escondido, whereas at Rama, 65 miles upstream to the west, the records will show but 100 inches. In the eastern portion of the country the period of rainfall extends through a greater part of the year, and frequently there is no real dry season. The soils of eastern Nicaragua are tighter, however, possessing more clay, and have a higher water-holding capacity. For this reason, even in the dry season, the countryside presents a greener appearance than that in western Nicaragua after a similar period of no rain. The effectiveness of rainfall in Nicaragua is not known.

Lands

Nicaragua is the largest of the six Central American Republics, with a population of 1,013,946 people in 1941. It has a total area of 148,000 square kilometers (approximately 57,000 square miles - about the size of Wisconsin), including the two large lakes which occupy 9,000 square kilometers. This leaves a net area of 139,000 square kilometers or approximately 34,000,000 acres *(14)*. About 20,000,000 acres of this land has been reported as arable *(8)*, with around 1,000,000 acres in cultivation (2.9 percent), 600,000 acres in fenced grazing land (1.7 percent), and 10,000,000 acres in timber (29.4 percent). Cumberland *(6)* has estimated that wasteland comprises 33.4 percent and timber 33.3 percent of the net land area of Nicaragua.

The western portion is composed of soil of recent volcanic activity and is rich in plant nutrients. In certain areas it may be 30 feet deep. In contrast, in the eastern section of the country, where the rainfall is much greater and more prolonged, the soil is mostly derived from a different kind of rock and is probably lacking in the abundance of plant food found in the western side of the country.

Vast tracts extending for many miles inland from the Caribbean are subject to flooding by the rivers traversing them and are swamps a great part of the year. This, combined with a lack of land transportation, makes communication most difficult throughout eastern Nicaragua.

Transportation

Perhaps one of the chief factors retarding progress in the past has been this lack of adequate land transportation throughout the country. Under the aegis of a

[3] Rainfall data from U. S. Canal Commission and U. S.-Nicaragua Cooperative Experiment Station.

FIGURE 7. — Reference map of Nicaragua.

loan from the United States Export-Import Bank, roads are gradually being improved throughout western Nicaragua. Construction is also in progress on the east-west highway that will connect Managua, the capital, with Rama, located 300 kilometers (186 miles) distant on the Río Escondido, 65 miles upriver from the Caribbean port of Bluefields. About the first 200 kilometers (100 of which are hard-surfaced) now are passable during most of the year; the remaining portion is usable only in the dry season.

FIGURE 8. — Slow but dependable transportation moves products of agriculture and commerce where truck roads are lacking.

The Pan American Highway enters Nicaragua from Honduras near the town of Somoto and runs in a more or less southerly direction through the western side of the country and some of the principal cities. It traverses some of the richest agricultural areas. The road is hard-surfaced for about 180 miles and graveled in varying degrees the rest of the way.

Automobiles and trucks exist in practically every center of any size, and several motor-transport companies are in operation. As good roads increase in mileage, motor units will increase in number, and the products of distant agricultural areas will have quick access to market. Oxcart roads, deeply worn throughout the centuries, and trails not passable for wheeled vehicles, except in the dry season, connect all other places of population on the western side. At present the ox is the chief source of power throughout the country. Though slow, he is sure, and once started can be depended upon. Where the rainfall is heavier, east of the Cordilleras, chief dependence is had on the pack ox or bull as a better and more dependable traveler in the deep mud of the paths.

The Pacific Railroad has a total of 369 kilometers (229 miles) of main-line track, with the main line running from Granada to the Pacific port of Corinto (190 kilometers - 118 miles) and with branches to several agriculturally important regions of the country. A policy of new construction has been in effect during the past 10 years. At present the railroad is the chief means of communication by land in this western section. Livestock products and livestock, the latter usually arriving in droves at the rail centers, are exported from the railroad company's piers at Corinto and San Juan del Sur *(16)*. The various river systems are the important paths of transportation in the Caribbean side of the country. These streams are navigable up to the fall line, which occurs at varying distances upriver but is in general about 60 to 70 miles from the mouth. Above this point, the streams are used only by canoes or dugouts. Because of this transportation restriction, all livestock ventures east of the Cordilleras are confined to the river banks.

Use is also made of air transport for parts of the country not accessible by road. The chief income of one of the operating air lines serving the eastern part of

FIGURE 9. — An excellent Bermuda-grass pasture in western Nicaragua. Photographed during the dry season.

the country is derived from freight, including all classes of livestock products, transported to the various gold mines that are operated in the area. Some enterprising stockmen have even discussed the possible use of the airplane to deliver carcass beef from the ranches that could be established in this eastern section.

FEED SITUATION

Area in Pastures

As one travels by air, he can easily see that Nicaragua is a country with vast areas, which, until transportation is available, will always be forest or grassland. And this is exactly how the area is being used *(14)*. Cabrales *(3, p. 13)* lists a total of 259,679 manzanas (about 449,000 acres) of pasture land reported by those stockmen making census returns. He also estimates that because of incomplete returns this area should be doubled. On this basis, the pasture land would be nearer 520,000 manzanas, or approximately 900,000 acres, in improved and unimproved grazing land. Cumberland's estimate of 2 percent of the total land area utilized for grazing would reduce this to around 680,000 acres *(6)*. The fact is that some cropland also may be used as pasture in the course of its history. Thus, Cabrales' figure is believed to be the more accurate of the two. As actual land-use surveys are nonexistent, these two sources are deemed reasonably close. Incidentally, there are now large areas of wasteland (deforested land along the road to Matagalpa and in the eastern savannah) that during some part of the year are grazed by stock. The Government of Nicaragua realized that part of its wealth consisted of grazing

FIGURE 10. — Jaragua-grass pasture in the dry season. The grass at this stage of maturity has little, or no, feeding value.

lands and, before 1898, is recorded to have offered a premium of 2 pesos per hectare (2.5 acres) to induce grazing on the eastern side of the country *(15, p. 54)*.

FIGURE 11. — Unirrigated guinea grass in dry season - part of a rotational-pasture area. Note better utilization as compared with fig. 12.

Value of Pasture Land

The value of land used for livestock naturally varies with its proximity to market and its accessibility. Even in the western part of Nicaragua, near the centers of population, farm acreage used as dairy land may be valued at different prices. Near Managua along the Pan American Highway it may cost C$500 ($100) per manzana (1.73 acres), and lesser values obtain near other centers. Land along the railroad likewise has more value, sometimes up to C$300 ($60) per manzana. In more distant regions, especially those accessible only by trail, land may be purchased for as little as C$5 per manzana ($1.00 per 1.73 acres).

FIGURE 12. — Unirrigated guinea grass in the dry season - on low land that probably has a high water table.

Forage Crops

Grasses

Large areas of native forages are depended upon in some of the less accessible regions. This vegetation has been described by Hitchcock *(9)*. These grasses seem to be reasonably productive for fattening cattle, though there is a constant search for plants with superior fattening properties.

The grasses that predominate in the planted grazing areas are guinea *(Panicum maximum)* and jaragua *(Hyperrhenia rufa)*, especially in the regions of lesser rainfall, though carpet grass *(Axonopus compressus)* is quite common in Chontales. Guinea grass is most highly esteemed because of its fattening qualities,

and because it provides forage in the dry season. Jaragua is deemed a good fattening grass when young, but unless carefully managed it soon grows tall, becoming woody and unpalatable, thus furnishing feed for only about a 3-month period. These are the two grasses that are most widely planted when pastures are improved. In the highlands behind Matagalpa, one can look for miles over waving fields of guinea grass. Throughout this area the altitude is high enough even in the dry season for sufficient precipitation to keep the grass from becoming as brown as it is at lower elevations or where the dry season is longer. Much Pará grass *(Panicum purpurascens)* can also be observed throughout these higher regions. Some few ranchers in the western lowlands have found by experience that the best method for handling the tall bunch grasses, such as guinea and jaragua, is to graze them heavily toward the end of the wet season so that all the surplus growth is removed. The pastures are then rested and invigorated by the subsequent rains. These two grasses produce enough new growth during the rainless period to furnish forage that otherwise would not be available.

On paddocks near headquarters some dairymen fit grass into a sort of crop-rotation program. The seeds of guinea or jaragua, usually the latter, are sown in between rows of corn at the time of the last cultivation. This "cover-crop" protection, combined with the rainfall during the remaining part of the wet season, produces a lush growth of a dense, carpetlike stand of grass. Such pastures have been found to be particularly valuable for the young stock, and, with proper handling, the grass endures throughout the dry weather.

An old stand-by in some areas of the world has been gaining favor in Nicaragua only within the past 5 years. This is molasses grass *(Melinis minutiflora)*. At elevations of 1,000 feet in the Sierras of western Nicaragua this grass is frequently green when others are dried up through lack of water. A common remark made by Latin American ranchers is that this grass has tick-repelling properties. This, however, remains to be conclusively demonstrated. More likely, the sticky soft hairs of the grass stems prevent the seed tick from using it as a pathway to the animals *(4)*. At elevations of less than 500 feet molasses grass may be observed in sizable plantings only at the *Ingenio San Antonio* near Chichigalpa in the western coastal plain. Here it has proved quite palatable and productive of milk.

FIGURE 13. — Guatemala grass *(Tripsacum laxum)* in a trial planting at El Recreo Experiment Station.

In the lowlands where moisture is present the best paddocks contain a species of *Panicum* similar to Pará and another grass that appears to be Mexican grass *(Ixophorus unisetus)*. Both are highly thought of by those who depend upon these two grasses. Fields of pure Bermuda have

also been observed. In fact, one rancher expressed the belief that his Bermuda pasture excelled his guinea or jaragua pastures in the amount of feed provided in the dry season.

Many other grasses, weeds, and even trees offer sustenance during the long dry summer.

FIGURE 14. — Calves eating green banana leaves. Such feeds are widely used and greatly relished in the long dry season.

Legumes

The kinds of legumes depended upon and so common in many United States pastures are lacking in Nicaragua. The family of low-growing Desmodiums is quite prominent, but all such low-growing legumes are soon eliminated through heavy, unregulated grazing and by burning. The browse legumes, such as *Agati grandiflora*, *Leucaena glauca*, and *Desmanthus*, also are present in the country. They have not been so widely used as forage plants, however, as is customary in other parts of the world, probably because they are considered brush and are chopped down when the pastures are cleaned. What appeared to be a woody Desmodium has been observed in pastures in the highlands behind Matagalpa. Trees similar to *Prosopis chilensis* have been found, but they apparently are not widely distributed, and they are not used in stock feeding. The slow growth of young stock is attributed in part to this lack of a sufficient quantity of good legumes.

The best stockmen are keenly aware that desirable pastures in the Tropics, as elsewhere, are those that contain a balance of legumes and grasses. Some feel that for best results the legumes should be those that are indigenous to the area. Much study still is needed before definite recommendations can be made regarding these phases of pastures and pasture management.

Dry-Season Supplements

"Guati"

A common practice followed in some of the drier sections where herds are small is to feed the dried young corn plant ("guati"). Toward the end of the rainy season, corn is thickly seeded in closely spaced rows. When the growth has attained a height of about 3 feet, the whole plant is uprooted and dried to a brown color. This dried forage, parceled out to the work animals during the drought, is supplemented by the scanty feed that can be obtained through grazing. Thus, the animals do not become so emaciated as they would if there were no attempt at feed preservation.

Hay and Soiling Crops

Hay is not unknown and is usually made from Pará grass by those having low-lying lands that permit year-round growth of this forage. Requests have already been made for seed of such grasses as Rhodes grass that also could be cured for hay.

Fresh green guinea is also cut for feed, usually from irrigated areas, and has been known to sell for C$25 ($5) per cartload (probably about a ton). Pará grass is also cut and sold to those who wish to buy it.

Silage

The better dairymen of Nicaragua have realized the value of some means of feed storage during the dry season and are making wide use of the pit and the trench silo. The more progressive dairyman would not think of starting a herd without dependence upon this method of forage preservation. Most silos are found around the cities, where there is a greater demand for milk and its products. These are chiefly pit silos. This wide use of the silo has enabled milk production during the long dry summer and has tended to stabilize the price of milk to the consumer. For instance, in the back country, where silos are not used, milk may sell for 20 centavos (4 cents) per liter (about 1 quart) in the season of good grass and when all the cows are at the peak of production, whereas after the rains stop the price may go as high as 36 or 40 centavos (7 or 8 cents) per liter. The advantages of the silo were introduced to Nicaragua by Professor Jewell B. Knight, who was brought to the country in 1928-29 from the U. S. Department of Agriculture by Nicaragua's first Minister of Agriculture *(10)*.

Corn is the chief silage crop, though various kinds of sorghum and sugarcane are also frequently used. The acreage of corn needed to make a ton of silage varies. One of the best farmers in the country has kept accurate records of his silo fillings. These show that during a 5-year period the average acre-yield per harvest has been about 8.6 short tons of fresh silage at a cost of about $2 per ton. He has developed an early maturing (90 days) yellow corn for his special needs and can raise two crops per year. Much remains to be done, however, in increasing the tonnage. Another farmer has two trench silos, each measuring about 100 feet long and 10 feet deep. In cross section they are about 15 feet at the top and 9 feet at the bottom. It takes about 35 acres of corn plus 17.5 acres of sugarcane to fill these two silos, which are estimated to have a total capacity of over 700 tons of settled silage.

FIGURE 15. — When both water and forage are lacking, banana trunks are food and drink to many cows.

Though corn is the chief forage, and two plantings may be harvested, serious crop losses occur through undue droughts in the middle of the rainy season. Frequent inquiries have been made of the authors concerning the use as silage crops of the forage sorghums of surplus pasturage and the deep-rooted, drought-resistant legumes, along with molasses, in order to ensure full silos when the corn crop fails.

Concentrate Feeds

Certain of the better dairies - not many - feed some grain and a protein supplement to their cows. The grain is chiefly corn, though one also finds barley and sorghum grains being fed in certain areas. Protein supplement, when fed, is either whole gin-run uncrushed cottonseed or at times crushed cottonseed cake. Though much sesame is produced each year in Nicaragua, this seed is usually exported, and thus little byproduct is available for feeding. Some flaxseed is also produced, but not much use is made of the press-cake meal. Wheat bran is also available in small quantities.

Concentrates and protein supplements are also fed to horses, swine, and poultry. The feeding of any kind of concentrate is expensive, however, and especially so with corn and the sorghum grains, which are so widely used for human food. Because of this, only the best animals are fed grain or supplements. Thus, as herds improve, men are thinking about legumes for use in pastures and as a supplement to corn, etc., in the silo in order to produce animal products at prices that the people can afford to pay.

Effects of Dry Season

For those who lack silos or other supplementary feed for the dry season, the limiting factor in livestock production in western Nicaragua is the 6-month dry period. In many parts of this area animals are reduced to "skin and bones" by the time the rains again start. Deaths due to drought are not infrequent and sometimes numerous. Thus, alternate periods of feast and famine limit growth and so lengthen the time required for an animal to attain its objective - meat, milk, or work.

FIGURE 16. — Making excavation for a pit silo.

CATTLE

Development of Cattle Raising[4]

Cattle are said to have been first introduced into Nicaragua about 1526 by Pedrárias Dávila. Conditions were so favorable and the range was so unlimited that a prodigious multiplication is reported to have resulted. This statement is borne out by records showing that meat could be purchased at the rate of 28 pounds for 1 real[5] in 1576, but, by 1606, 40 pounds could be obtained for the same sum. In these early days

[4] A short treatise on the cattle of Nicaragua by Luis Alberto Cabrales *(3)* has been drawn upon for the information presented in this section.

[5] A real is considered to be worth 0.10 peso (or córdoba as the monetary unit is now called, which at present rate of exchange is worth 20 cents).

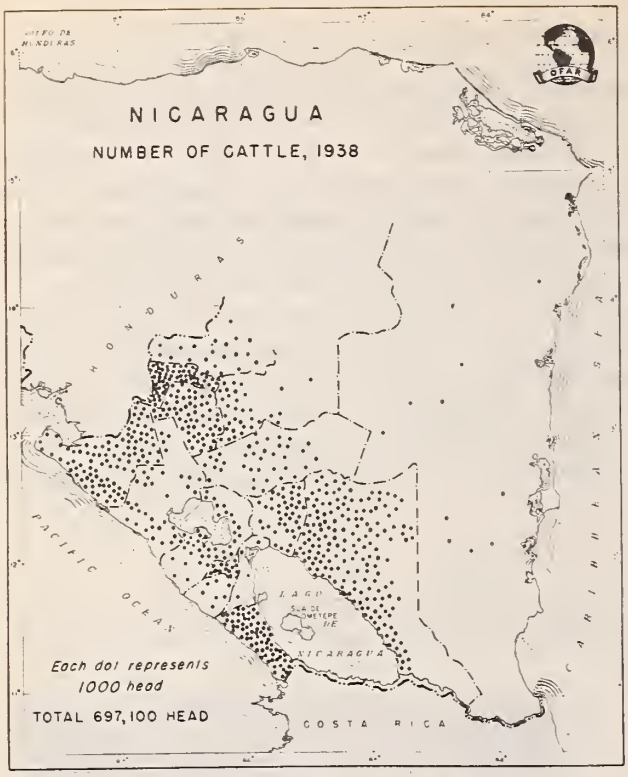

FIGURE 17.—Cattle are rather uniformly distributed in the heavily populated western area.

cattle were killed as much for hides and tallow as for food. Even until 1728, a steer was worth only 21 to 31 reals.

Nicaragua has always been a source of food supply for its neighbors, and this has been particularly true as regards livestock and livestock products. Cabrales cites the early official records of the market fairs of various towns in Guatemala. For instance, 10,159 head of Nicaraguan cattle are officially reported to have been taken to the fair at Jalpatagua, Guatemala, in the year 1797. Sales at other fairs, in regions with a much smaller cattle population than Nicaragua's are reported in these early years, but the extent to which the animals sold may have originated in "the Texas of Central America" is not clearly indicated.

Beginning in 1821 with the Declaration of Independence, whereby the Spanish colonies eventually gained their freedom, much internal strife occurred, with a marked reduction in the cattle population. Fifty years after this proclamation, in 1871, prices in the Greater Republic of Central America had risen, and some distinction as to kinds of meat was in effect, thus: 1 real for 2 to 4 pounds dried meat, 1 real for 1 pound fresh meat (not otherwise designated), and 2 reals for 1 pound of "lomo" (loin). The price of cattle had reached from 16 to 20 pesos by the same time.

Through the years the reduction in numbers was further hastened by the indiscriminate slaughter of female stock. The apparent disregard of the value of the cow stock was continued until 1933, when a national law was passed prohibiting the slaughter of females except in certain months of the year.

Census of Cattle Population

The census of livestock population is taken by the Statistics Section of the Government of Nicaragua. Incomplete returns fail to give a true picture of the number of cattle in the country, which have been variously estimated at from 250,000 to 1,000,000 head. On the basis of the known slaughter and export records during the past 10 years, the writers have estimated that the present total cattle population is not less than 750,000 head and may number as high as 875,000 head. A safe statement is that as far as cattle numbers are concerned Nicaragua has more than any other country of Central America and through the years has supplied feeder cattle and fat stock that have gone to destinations as far away as Peru. In fact, some have been traced to Mexico and the United States.

At the time of writing this report (1945) the most recent census returns were for the year 1938 *(14)*. Even these data are incomplete, owing to the lack of returns

TABLE 2. – *Cattle numbers in Nicaragua, by Departments, specified years*

DEPARTMENT	1871	1898	1908	1938
	Thousands	*Thousands*	*Thousands*	*Thousands*
Managua	–	40	–	40
Granada	–	15	–	4
León	–	50	–	36
Chinandega	–	50	–	97
Masaya	–	10	–	14
Rivas	–	20	–	68
Carazo	–	5	–	7
Estelí	–	–	–	59
Matagalpa	–	18	–	36
Jinotega	–	25	–	33
Nueva Segovia	–	35	–	20
Madriz	–	–	–	62
Chontales	–	40	–	170
Boaco	–	–	–	41
Zelaya	–	5	–	10
Total	[1] 1,000	[2] 313	[3] 252	[4] 697

[1] Estimate of Levy reported by Cabrales *(3)*; not broken down by Departments.

[2] Reported by Niederlein *(15)*.

[3] Reported by Cabrales *(3)*; census of 1908 not broken down by Departments.

[4] ANUARIO ESTADÍSTICO *(14)*.

from different jurisdictions of some of the Departments. These statistics give the total cattle population as 697,128 head, including 235,068 males and 462,060 females. No other distinctions as to sex, use, or age are made. According to this census, the greatest concentrations of cattle are in the Departments of Chinandega (about 13 percent), Rivas (about 9.5 percent), Chontales (about 24 percent), Madriz (about 9 percent), and Estelí (about 8.5 percent). In general, these are the areas of more extensive pasture lands and larger individual herds. This distribution for the country as a whole is shown in fig. 17.

The number of cattle has not remained static as can be seen by comparing the reported figures for the Departments in 1898 and 1938 (table 2 and fig. 18). From a high of 1 million in 1871 there was a reduction of the total in the country to 252,000 in 1908 after which cattle numbers appear to have increased.

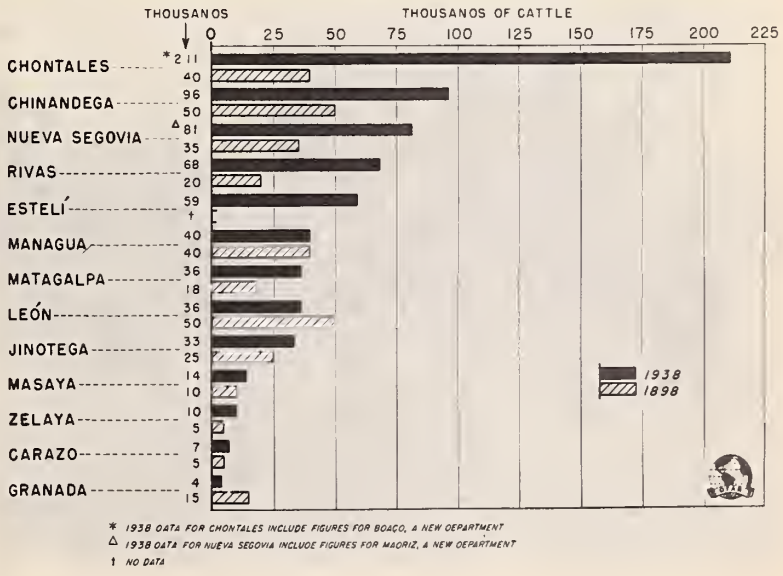

FIGURE 18. – Forty-year advance in Nicaraguan cattle numbers.

Breeds and Breeding

Use of Imported Stock

FIGURE 19. — A calf, one-half zebu and one-half Swiss - a popular cross in Nicaragua.

A number of bulls of various breeds have been brought into the country through the efforts of the Ministry of Agriculture and also by prominent stockmen. Usually they have been "pampered" animals and have not thrived. Range-bred or other rugged bulls imported from sections of the United States more nearly similar to Nicaragua have been better able to adapt themselves to the conditions of the country. Breeds imported include the Santa Gertrudis, Hereford, Angus, Shorthorn bulls of various Indian races, Holsteins, Guernseys, Jerseys, Brown Swiss, Ayrshire, and Red Polled. All these have left their imprint in some way, but the predominant influence has been made by bulls of the Holstein, Guernsey, Swiss, and Red Polled breeds, and by males from India popularly called "Nellores." In addition to being tropical cattle, Indian bulls are liked, because the oxen produced from them are usually fast steppers as compared with those of other breeds.

Results of Improved Breeding

Of all the "beef" bulls used in the country, the Red Polled and the Indian bull have already demonstrated their ability to go into these herds and compete on the range. The Red Polled bull is, however, at a disadvantage as a producer of yoke oxen, inasmuch as the type of yoke used in Nicaragua is a head yoke fastened to the horns. Recent importations of sires of the Santa Gertrudis breed give evidence of much promise if they are properly handled, though the present lack of females of the breed precludes any great influence.

FIGURE 20. — Crossbred Indian bull, such as frequently found in the range country.

There has been much talk of importing the American-type Brahman (zebu) after the war in order to improve fleshing qualities. Some stockmen believe that the use of this breed would increase rather than decrease

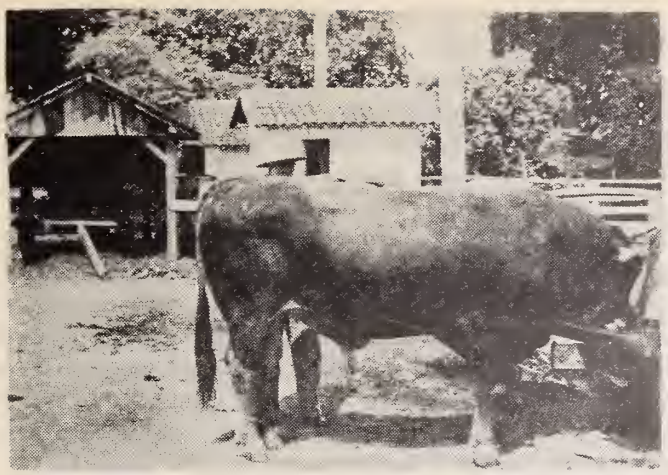

FIGURE 21. — Royal Prince, an imported Brown Swiss bull at Ingenio San Antonio. This breed has done well at low elevations.

the percentage of "Indian" blood, thus averting a further loss of resistance to climatic and health conditions.

The common practice of not castrating males until they reach ages exceeding 1 year works against the introduction of the better fleshed imported sires, since the youngsters also run with the herd as potential sires.

Ranch Practices

Pasture and Ranch Management

Some of the better stockmen try to follow some system of pasture management, especially rotational grazing. Certain ranchers having land in various parts of the country may be more fortunately situated than others and can move their cattle according to the availability of the pasturage. The others, having neither this opportunity nor access to stocker cattle, are not able to follow a flexible stocking scheme, though they try to care for the grazing areas as well as they can. There are a few stockmen who are successfully practicing a system of crop rotation including pastures on fields of smaller area. These are usually nearer the population centers. Thus, in a way, the land is rested and partially fertilized for corn, beans, etc., through the droppings of the cattle.

Away from the urban centers, cattle are grazed in rather large paddocks. In some regions, where full use is not made of existing forage, one frequently sees other pastures that present evidences of overgrazing. Thus, no figure can be given for the rate of stocking. Possibly part of this condition results from certain restrictions requiring permission for the movement of cattle from regions infested with "*tórsalo*" (*Dermatobia hominis*)[6] to torsalo-free regions. Those stockmen who are able to move their animals freely usually have them in better condition, and they utilize the pastures to better advantage. This is especially true as the dry season continues.

FIGURE 22. — Calves of improved breeding on irrigated guinea-grass pasture.

[6] Variously known in other American Republics as torcel, torcelo, nuche, gusano de monte, gusano de zancudo, gusano moyocuil, gusano macaco, colmoyote, ura, etc.

Effects of Burning Over Lands. - The usual practice is to burn all pastures at some time during the dry season. Under the present system of management this has four advantages - (1) it destroys the previous season's hard woody growth; (2) it lessens, if it does not temporarily eliminate from the area, the ever-present cattle tick; (3) it permits the young grass to come up, and after several weeks this provides some green feed for hungry cattle; and (4) it assists in destroying some of the unpalatable brushy undergrowth.

On the other hand, this annual burning effects a severe hardship on most plant cover. Perhaps this is the chief reason that the two most widely used grasses in pasture improvement are guinea and jaragua. Well-known is the fact that molasses grass does not survive this treatment. In all probability this is the case with many of the indigenous legumes, since they have been found in other parts of the country where the growth has not been so molested. Though burning is widely practiced, there are many diverse opinions even among stockmen as to its advisability. The *Revista Agrícola* has occasionally listed the advantages and disadvantages of the practice as commented upon by outstanding people of the country.[7]

Lack of Mowing Machines. - Little use is made of mowing machines in pasture control, for there are few in the country. Even if available, some stockmen doubt whether they could be used on the large bunch grasses, such as guinea, except where these are grown as soiling crops. Although these men have expressed great interest in other implements for use in pastures, the machete will probably remain the principal tool for keeping the pastures clean. The belief is that one of the chief faults in the present methods of pasture use is in failing to stock the tall-grass paddock with enough cattle at an early date and in maintaining control through stocking so that advantage is taken of the high protein of the young forage. Naturally this is difficult when all pastures are ready for grazing at the same time. At the cooperative United States-Nicaragua Agricultural Experiment Station a pasture area has been laid out in order to study the best methods to use in tropical pasture management.

FIGURE 23. — One method of preparing land for new pasture seedings is to leave some of the brush to protect the young plants from the intense rays of the tropical sun.

Need For Differentiation In Stock

The cattlemen of Nicaragua are intelligent and keenly interested in breed improvement. They are handicapped in carrying out their programs, however, by the lack of skilled help and by

[7] Comments by stockmen in various numbers of the *Revista Agrícola*.

the lack of knowledge of efficient ranch practices so common in the United States. In general, the statement can be made that there is little or no distinction as to the function an animal is to perform; and before marked progress can result, such animal segregation must be made. In rural areas the common practice is to use cattle for the dual purpose of milk and beef. The direct result of this is an almost nonexistent milk supply and a loss of at least 50 percent of the calves, whose deaths, when not due to starvation, are a result of such lowered resistance that they succumb easily to the many diseases and parasites that are ever present.

FIGURE 24. — Herd of cattle being used for the dual purpose of milk and meat.

This has worked a real handicap on the herds most distant from market, especially when dairy bulls have been used in heading up a herd of native cows, for considerable udder trouble has been experienced among the resulting heifers when handled as were their dams. Thus, even in those herds that properly should be termed "beef producing," and which actually are the greatest sources of fat stock, any cow may spend part of her lactation in the milking unit. No premium is paid for quality meat; cattle for beef frequently sell for prices computed per inch of height at the shoulder rather than per pound live weight. This fact may account in part for the preference for Indian bulls, because the offspring usually have added height in the forequarters as compared with those sired by blockier bulls. Thus, there is no commercial incentive to produce heavy-set, well-fleshed animals, such as are common in the United States.

Breeding Season, Bull-Cow Ratio, and Other Factors

Only a few *fincas* have a definite breeding season. The usual practice is for cattle of all ages and both sexes to run together throughout the year. Though this is true, the writers have observed that fewer calves come in the months August to February so that a rather well defined natural calving season does seem to exist. This begins in late March or April and falls toward the latter end of the dry period. Because of the lack of forage at this time, the cows undergo a severe hardship.

The bull-cow ratio varies in Nicaragua as it does in other countries. The response most frequently given to questions in this regard is "about 20 to 25 cows per bull."

Castrations are delayed until the young bulls are 1 year old or more. In fact, a not-uncommon occurrence in some areas is to find almost equal numbers of males and females. It is true that, because of shortages of slaughter stock, certain legal restrictions have been placed on the killing of "vealers." But this seems no valid

FIGURE 25. — A criollo cow, which probably represents some of the last "undiluted" stock of this type.

reason for not practicing early castration. Some opinion has been expressed that, since many of these males are eventually used as draft or pack animals, the adoption of the practice of early castration would result in a neck of less muscling; thus the animals would not be so strong in applying power from the head yoke.

Separation of the sexes is also delayed so that heifers frequently conceive at too early an age, thus adding another handicap to their growth.

All owners brand their stock. The usual brand consists of the initials of the owner, though there are also figures of different kinds. The first brand is most often placed somewhere on the rear part of the animal, and ownership is judged by the most forward mark.

As a result of a depletion of cow stock some years ago, as already mentioned, a law was passed prohibiting the export or slaughter of any females except in a few months of the year. Naturally this worked a hardship on those who wished to cull certain animals from their herds. Probably, under existing conditions, however, the desired increase in numbers could have been effected in no other way.

Round-ups may be at 6-month or yearly intervals, frequently the latter. Corrals with chutes whereby cattle may be separated are few. The common method is to herd all the animals into one large corral. Then those desired are roped from among the others, castrated, earmarked, branded, or otherwise operated upon, and turned loose in the same corral. All this results in much

FIGURE 26. — A typical criollo bull.

confusion and is equally hard on man and beast.

FIGURE 27. — Cattle in large corral, where they will have their horns tipped and receive injections of various biologics.

Equipment

Corrals may be enclosed with fences made of barbed wire, boards, stone, and sometimes of a plant that resembles the pineapple *(Bromelia pinguin)*. Fencing is usually of barbed wire, of which many strands are used, attached to living posts of many different species, which when unattended soon become a line of trees. Lacking wire, many different kinds of plant material are used in fencing as is customary in Cuba *(5)*.

Watering takes place from streams, lakes, or wells, depending upon the geographic location of the finca and the availability of surface water. Some wells have been hand-dug to a depth of 300 varas (825 feet). These are usually in areas where natural water supplies are lacking in the dry season, and even from these wells the flow is restricted during this period of the year. The water is obtained from these deep wells by means of a horizontal windlass operated by a yoke of oxen. One 50-gallon drum is raised while the other is being lowered. A few watersheds and storage basins for collecting rain water have been observed, but are not common in the cattle country. In some places, use is made of windmills with elevated storage tanks, from which the water is piped.

FIGURE 28. — Oxen drawing water from a well - in background - about 900 feet deep.

Ranch buildings vary considerably from excellent to very simple structures. Shelter is rarely provided for range cattle, but generally sufficient trees abound, under which the animals seek shade in the heat of the day. Many ranches have dipping vats, though the practice of spraying, or swabbing, is also followed. A commercial

FIGURE 29. — Typical dairy barn of the best type in Nicaragua located in Matagalpa highlands.

livestock dip, an English product, is the standard insecticide. Until recently most ranchers have allowed a 3-week interval between applications of insecticide.

Location of Dairy Herds

The dairy industry of Nicaragua has been thoroughly presented by Dahlberg and Hodgson.[8] Thus, this section is most brief and is only included, because dairying is an important part of the livestock industry.

Near such centers as Managua, León, Granada, etc., a pattern approaching modern dairy methods is found. In some of the best dairy herds in Nicaragua the cows are now milked twice a day, but farther from market the practice is once-a-day milking. Because of lower temperatures, the market milk is usually obtained in the early morning hours. The calf is used to start the flow of milk and is then tied to the front leg of its mother. Following milking, the calf is permitted to run with the cow in the pasture until evening, when it is separated from its mother until after the market milk is obtained in the early morning.

This same custom is frequently observed in many of the dairy herds milking twice a day. Naturally heavy calf mortality results from this method of handling. In one instance, it was more than 50 percent.

Milk-Pasteurizing Plant

Nicaragua has at Managua the only real milk "central" in the country. It is a rather compact, complete unit with pasteurizing plant, cheese vats, and churns to take care of the great "surplus" of fluid milk that comes in during the rainy season. The plant is equipped with modern United States machinery throughout, though, because of the war, great difficulty has been experienced in obtaining replacement parts.

Milk is purchased by weight and not on fat tests. From each can entering the plant a sample is taken for the determination of acidity and specific gravity. These two simple precautions have done much to ensure a better supply by preventing the watering of milk and the delivery of old milk. Deliveries in quart bottles and in bulk are made daily to certain key distribution centers throughout the city. The consumers go early to obtain their milk, some in bottles, but most of it in the kettles in which it will later be cooked, for the people have found that without refrigeration milk can be preserved only through cooking. A cheddar-type cheese of fair quality is made, mostly for export to neighboring countries. The manager of the

[8] DAHLBERG, A. C., AND HODGSON, R. E. THE DAIRY INDUSTRY OF NICARAGUA. U. S. Bur. Dairy Indus. 30 pp. (Rpt. based on study made on behalf of Food Supply Div., Office of C.I.A.A.) 1943. [Mimeographed.]

plant is a young graduate pharmacist, a keen, intelligent youngster, who is always studying books about his business.

Though not really organized as a cooperative, the producers supplying the plant are known as the "Cooperative Milk Producers Association" of Managua, and contracts are made in order to ensure the milk supply to the plant. The price paid to the producers remains uniform throughout the year at around 25 cents per "gallon" of four liters, with a somewhat higher price in seasons of severe shortage of fluid milk. The price paid is given the producer for all his milk, and there are no class differentials.

Milk comes varying distances to this market. If by two-wheeled oxcart, the journey may take as long as 5 hours from the places most distant. One dairyman has a truck, which permits his milk to reach the plant in but 15 minutes. Another enterprising man is using a team of mules hitched to a rubber-tired four-wheeled wagon. His milk gets to the receiving plant in something over half an hour. Numerous producers make use of the railroad in shipping their milk. Most of these have their headquarters adjacent to the rail line, but some are several miles away, which necessitates oxcart transport to the station. Two trains a day in each direction mean that the milk from each milking gets to the plant within 6 hours. Throughout the rest of the country the milk is turned into butter or heavily salted cheese (*queso blanco* and other types) at the place where it is produced. On the most distant farms the cheese is smoked and dried to aid further in preserving it. While most of these cheeses are sold soon after making, some farms hold them for the dry season and the time of higher prices.

Dairy Sanitation

In general, the milk is not cooled at the farm, owing to lack of facilities. Certain more fortunate farmers, however, have streams of running water in which they place the cans during milking and until time to load them for shipment.

FIGURE 30. — Milking scene in Nicaragua. Note calf tied to foreleg of cow in the foreground.

As the trips to market frequently involve much rough handling, "liners" are necessary to make the lids set securely in the necks of the cans. Some dairymen use a parchment or oiled paper for this purpose, but the war made this imported material expensive and difficult to obtain. As a substitute, use has been made of wide strips of dried banana-plant fiber. At the dairy plant these strips are steam sterilized and returned to the producers inside the cans.

The production of milk under strictly sanitary conditions in Nicaragua, especially during the dusty dry season, is rather difficult, even when the owner of the dairy unit has an appreciation of its value. This is because the type of people who actually do the work have no idea of the relation of bacteria to milk souring, disease in animals, etc. Thus, the practice of boiling milk before use should not be discouraged.

FIGURE 31. — A simple milk-cooling system where cool running water is available does much to ensure better milk.

Diseases and Pests and Their Control

Anthrax is quite prevalent throughout western Nicaragua, and all stockmen make a practice of using North American biologics to control it. Similarly, much use is made of hemorrhagic-septicemia serum, especially in newborn calves. Many cattle have at times what appears to be a vesicular stomatitis (commonly treated with salt and lemon juice).

Tests for Bang's disease and tuberculosis are not made, and the actual degree of prevalence of these diseases cannot be stated definitely. However, the incidence of abortion in the dairies near Managua is sufficiently low to warrant the opinion that Bang's disease is not serious. During the residence of the writers, one large herd of about 200 cows of native and Brown Swiss breeding was carefully examined for the presence of the Bang organism by Dr. Hugh S. Cameron of the University of California. His findings showed the entire group to be negative.[9]

The traveling laboratory of the Pan American Sanitary Bureau has made a report on some of the diseases found in the country.[10] Of 2,026 animals in 36 herds in 5 different parts of the country, only 1.3 percent were positive and 1.2 percent suspicious of Bang's disease. Practically all these reactors were in one herd containing many imported animals. Cattle in 28 herds in the previously mentioned areas were also tested for tuberculosis by the intradermic method. The results of these tests were negative, and on this basis the Bureau reports that bovine tuberculosis is probably nonexistent.

The chief of this group has stated that the so-called criollo cattle are little, or not at all, affected with these two ailments, and that most of the infection is found in imported cattle or in cattle graded up to purity of the various breeds.

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[9] Personal statements.

[10] PAN AMERICAN SANITARY BUREAU, VETERINARY SURVEY GROUP. REPORT OF THE VETERINARY SURVEY, REPUBLIC OF NICARAGUA. Pan Amer. San. Group, Pan Amer. Union. 22 pp. Washington, D. C. 1945. [Typewritten.]

Blackleg is controlled through the use of biologics of United States origin. The annual sale for this and other diseases amounts to well over 80,000 doses. Occasionally in herds graded up to purity and with higher production, losses due to milk fever occur, and mammitis is common, probably because of nonisolation of infected cows and the severe treatment of the udder by the calves at the time of nursing.

Because of the prevalence of the cattle tick, the presence of piroplasmosis is unquestioned. The anaplasmosis organism has been isolated and is reported to cause greater loss than had been realized. Navel infection of calves combined with diarrhea (gastric enteritis) and anemia resulting from tick infestation account for the high mortality in many of the herds.

Pink eye or infectious keratitis is present in both old and young animals in one part of the country. Judging from livers that the writers have seen sold on the markets, there is little or no liver fluke in western Nicaragua. Actinomycosis has been observed frequently in draft oxen.

One of the most serious pests in the highland region is the *tórsalo* fly *(Dermatobia hominis)*. In addition to reducing milk production and retarding fattening, hides may be rendered completely worthless through the holes made by the grub of this fly. Lice have been found at times.

Probably one of the greatest spreaders of disease is the *zopilote* or vulture, the scavenger and the so-called "sanitarian" of the Tropics. On his feet and in his droppings, many organisms are spread, and he is by no means the sanitarian he is reputed to be. Thus, disease control is made difficult as long as this bird is uncontrolled.

An estimate of the losses from diseases and pests is not available. Certainly, for various reasons, calf mortality approaches 50 percent, and so one must consider it an important loss. If one takes even a part of the import of sole leather as an index, it represents considerable loss due to the *tórsalo* fly. No estimate can be made of the loss due to reduced milk yield and slow fattening because of the warble caused by this fly. The constant need of using biologics to protect the animals against some diseases is another item of importance.

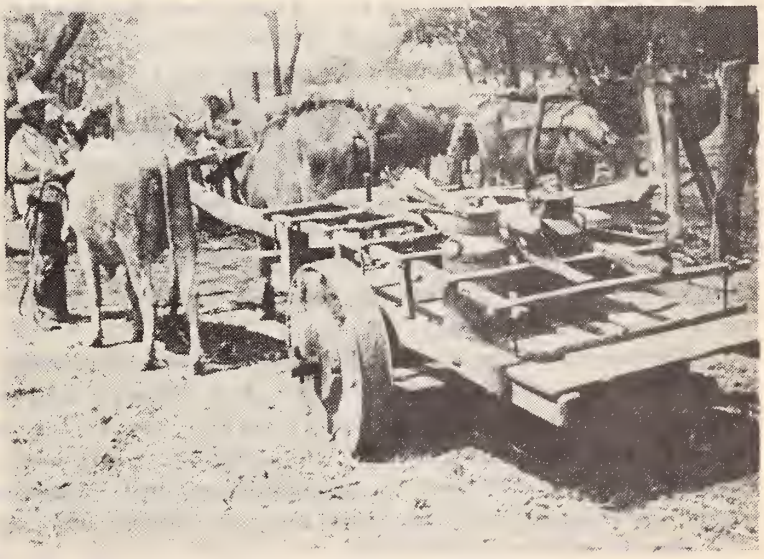

FIGURE 32. — Home from delivering the milk. Depending on size, each wheel of such carts may cost from $20 to $30. Size is determined by diameter of tree from which an entire cross section is taken to make the wheel, which has no metal or rubber rim.

Prospects for Improvement

The stockmen of Nicaragua whom the writers have consulted are intelligent, widely read, and desirous of introducing modern practices to effect improvement. They are particularly interested in animal breeding and welcome sound suggestions in practical management. There is much discussion regarding the improvement of native

FIGURE 33. — In some cases, "tórsalo" is more extensive than shown on this cow.

cattle through selection and grading up *(12, p. 21; 13, p. 28)*. The best run outfits are always those of which the owner is actually the working manager. The usual limiting factor, however, is the lack of proper training of the men who serve as herdsmen, caretakers, and workers. Several owners have stated that they would willingly pay higher salaries if they could find well-trained men.

Several young Nicaraguans are now attending the Pan-American Agricultural School in Honduras. As such graduates increase in number, a trained group should be available from which stock owners not directly managing their units can obtain competent working managers. Then, too, the cooperative agricultural-education program now under way in the elementary schools should be effective in providing a reservoir of people who have a better understanding of the various factors in animal industry.

EQUINE ANIMALS

The Horse

The general run of horses in Nicaragua is small, seldom exceeding 14 hands in height. The usual color is bay, though one may observe all the common coat colors. The animals are fine-boned and narrow-chested, with rather straight backs, but frequently with a steep croup. The muscling is rather good, and the horses are sturdy beasts. Some surprising stories are told of their endurance under the saddle through the deep mud of the rainy season. Even in Managua the coach horses run up hill and down from dawn till dark, drawing their heavy loads seemingly without exhaustion. It has been said that these small horses pack 100 to 150 kilos (220 to 331 pounds) for up to 10 kilometers (6 miles), and they have been seen with loads of three 60-kilo (132-pound) coffee bags on the coffee fincas. With lighter loads - 50 to 75 kilos (110 to 165 pounds) - they can traverse distances of up to 50 kilometers (31 miles) a day if the road is good.

Whether his size is due to malnutrition, inbreeding, use before he is mature, or is natural has not been determined, but observation indicates that even with good feeding the native horse seldom is large. The writers believe that his present size results from the fact that (1) the original horse was probably the Spanish Barb, a small breed; and (2) that he has made a natural adjustment, through the generations, to the environment and the conditions of feeding and management.

Horses of the country have five gaits, though one animal may not have them all. These are the walk, single-foot, pace, trot, and gallop. The most common are the single-foot and the pace, and animals with these gaits are most in demand for riding. The hoof is good and hard, and only in the city is shoeing practiced.

Breeds

Efforts have been made to improve the horse through the introduction of stallions, chiefly from Peru. The crossbred sons of these Peruvians are frequently seen in service throughout the country, and they have effected a marked increase in the size and constitution of their progeny. However, even these animals are too fine-boned, which might result from a mineral deficiency. Occasionally other breeds of stallions are observed - the English Hunter, various American saddle types, and the Arabian. Interest has also been expressed in the Percheron, though, except for drawing coaches, the horse is not used for draft. On the ranches in particular, there is real need for a heavier built, dense-bone type, such as the western quarter horse. Such animals, if brought into Nicaragua, should be range-bred if they are to make the best contribution. However, an observation is that as the size of the horse increases the animal needs more attention and is not so compatible to his environment as was his smaller ancestor, because he is much more susceptible to nutritional deficiencies.

Breeding Practices

Except in special instances where improved blood is being introduced, the sexes are not separated in the pastures, and the practice of early castration of the males is not commonly followed among the general run of horses. Ridgelings are frequently observed. Breeding begins around 3 years of age for both stallions and mares. Since under range conditions the mares are permitted to foal regularly thereafter, this is probably a contributing factor to the smallness of the horse in Nicaragua. The breeding season seems to be related to the growth of the grass with the onset of the rainy season. This opinion is based on the large number of newborn foals everywhere evident in the latter part of April. This, too, however, may vary with the owner, the amount of improved breeding in the horse herd, and particularly with the care, feeding, and management given the animals.

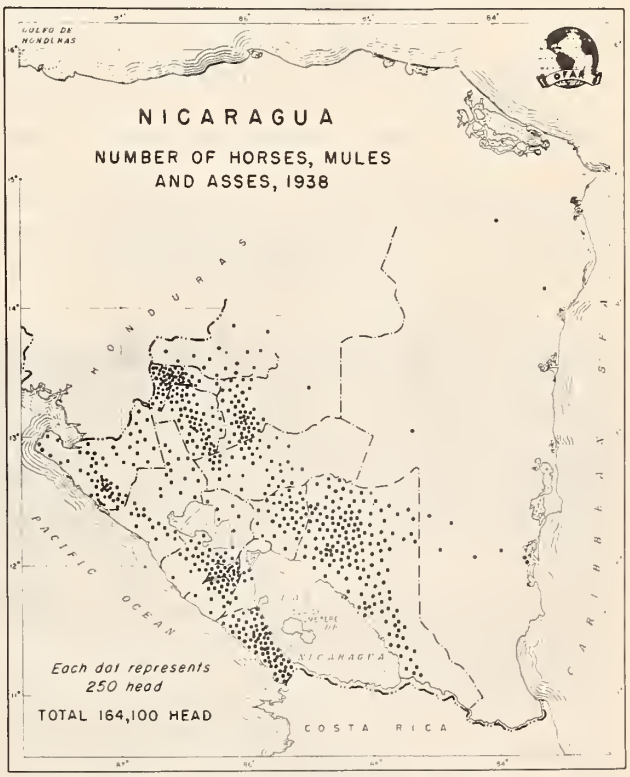

FIGURE 34. — Chontales being in the ranch area, leads in the number of horses, mules, and asses, followed by Rivas, Esteli, and Madriz. In all cities of the Republic, horse-drawn "coches" are more numerous than automotive transportation.

The Burro

The Nicaraguan burro is probably a descendant of the African ass brought in by the early settlers. He is 9 to 12 hands tall, more frequently the former, of a gray color, and often has long hair. His back is long and reasonably straight, but it usually has a steep croup. Many burros have crooked legs and are extremely weak in the pasterns.

Though frequently used as a beast of burden, the burro is chiefly used in the production of mules. A prominent mule raiser of Ocotal, Nueva Segovia, through selection of native stock, has been able to obtain a jack 13.1 hands in height and about 700 pounds in weight. Such initiative is highly commendable and illustrates the possibilities in development of local stock of all sorts.[11]

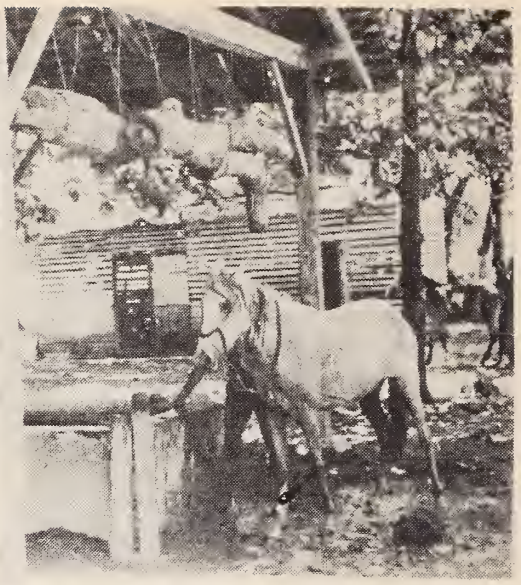

FIGURE 35. — Typical of the better mounts is this white stallion being washed and cooled after a hot ride. Note "beehives" hanging from rafters.

The Mule

The mule is much in evidence. As usual in such hybrids, the Nicaraguan mule is superior to both progenitors in his constitution. He is of the same or of somewhat larger size than the horse but is light-boned. There is real need for a good work mule, preferably of the cotton type. The change from oxen to mules would do much to cheapen the cost of production of many crops, because it would increase the speed of work. This is particularly true in moving products to market over the better roads. The limiting factor in the use of the mule for draft is the absence of "know how" in handling him. This no doubt will change as progress continues.

Though they usually make no choice of mares to be bred to produce mules, those who are attempting to improve the quality for draft purposes try to use heavier mares. These, under proper conditions of care and management, will produce mules 1,000 to 1,100 pounds in weight. From the ranch of the mule raiser of Ocotal, previously mentioned, 13 head of 4- to 7-year-old mules were purchased for use at the Inter-American Affairs project at Comayagua, Honduras. These weighed from 1,000 to 1,100 pounds, were well-balanced, and resembled the cotton mule of southern United States. They were also similar in type to the mule frequently imported into Central America by the United Fruit Company.

FIGURE 36. — The usual type of criollo horse.

The pack mule is a smaller beast of about the same general size as the run of horses and is able to bear a burden of 2 or 3 coffee sacks (120-180 kilos - 265-397 pounds) on short hauls.

Aside from their use in the cities as coach animals, both horses and mules are mainly used for riding (a good riding mule is greatly treasured) and as pack animals in the coffee country and in regions where the roads are unimproved. These pack mules usually carry a heavier burden than pack horses.

[11] Personal observations.

FIGURE 37. — A good native mule. Green "guineas" (related to the banana) are a favorite stock feed.

In the improvement of the mule, his use for this purpose must not be overlooked.

Numbers and Distribution of Equine Species

The available census figures list neither mules nor burros separately, and the presumption is, from the use of the term "*caballer*," that these animals are included in the totals. According to figures for 1938, the equine species totaled 164,086 in number, of which 75,304 were males and 88,762 females. There is no further break-down of the data. (See fig. 34 for distribution in the country.)

Diseases and Pests

Cattle ticks do not seem to bother the mules of Nicaragua, but they seriously molest the horses. No study of other parasites has been made, but horses are known to be treated by local veterinarians for internal parasites. One of the diseases causing heaviest losses in horse herds is influenza. This is commonly called *moquilla*, and it sweeps through herds like wildfire. Because the ranchers usually do not understand this disease, more animals die of it than need be. In one herd, the authors assisted in the diagnosis of influenza and treated it with massive doses of mixed bacteria. Through the practice of sanitation and isolation, in addition to treatment, losses have been materially reduced. *Morrina* (probably distemper) is also prevalent. Osteoporosis is reported, as are also sporadic outbreaks of *renquera* or *taranta*, which causes an irregular, staggery gait in the hind quarters and results in high mortality. *Tenchola* is a condition in which the opening of the mouth may increase on one or both sides. Some affected horses, when drinking, have to put the head under water almost up to the eyes. The use of the bit does not cause this, because young, unbitted horses are sometimes affected. Its cause is unknown, and control treatment varies.

FIGURE 38. — Much cargo is moved on the backs of burros.

SWINE

Swine are important in Nicaragua for several reasons. In addition to furnishing meat, they are valued even more as producers of lard. Cooking oils of all sorts, but particularly lard, rank high in the cuisine of the people of Nicaragua.

Numbers

The 1938 census listed a total of 222,706 swine as of the end of the year. This total includes 105,410 males and 117,296 females, with no other specifications. As in the United States, the hog population of Nicaragua tends to be concentrated in the corn-producing areas. Chontales, however, which produced only 4.2 percent of the corn in the census year, also reported 15.1 percent of the swine. (For distribution, see fig. 39.)

Types

No exact statement can be made as to the type of the "criollo" hog in Nicaragua. Judging by many of the nondescript animals seen going to market, the original stock must have been somewhat on the multicolored chuffy order. Evidently, however, swine of some of the improved breeds have been imported into the country. The white belt of the Hampshire is frequently seen, as is also the typical Berkshire head. A hog that appears to be a Chester White type has been observed, and some large spotted, lop-eared hogs are also seen. The Duroc is most in evidence as a pure breed, and 800-pound Duroc boars have been seen by the writers. The Ministry of Agriculture, through its School at Chinandega, maintains a purebred-Duroc breeding unit, and there are one or two other Duroc herds in the country.

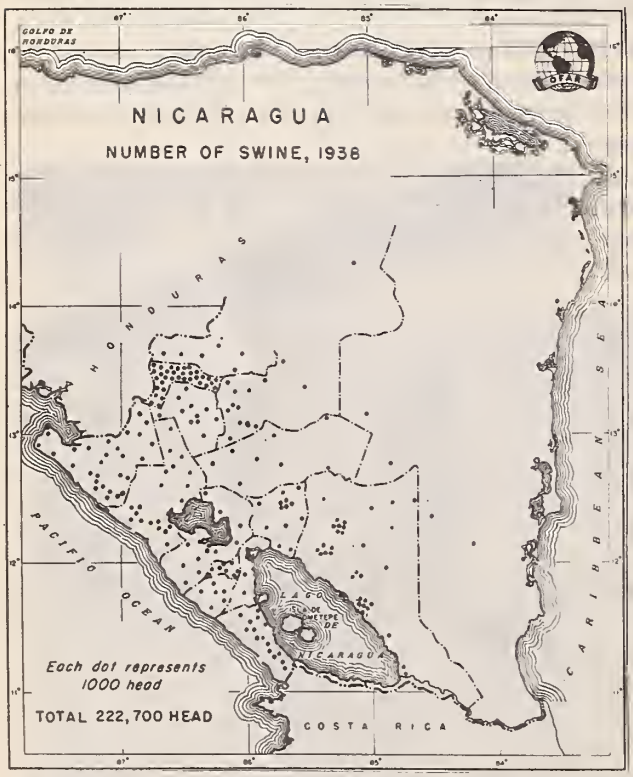

FIGURE 39.—Madriz has the largest number of swine, which are chiefly in the hands of smaller farmers. Chontales is second and León third. Swine are more numerous where the population is greater and are found in herds of from 1 to 4 head.

Feeding and Management

Swine frequently forage widely around the smaller towns, and even on the outskirts of the larger cities, and are not often kept in confinement. Certain owners do, however, raise improved hogs in pens and feed them according to approved standards. With proper sanitation, feeding, and management methods, these pigs grow rapidly to good weights. However, the lack of protein supplements and the high price of corn constitute a serious handicap to maximum efficiency in pork production, even under a good system of management. Slaughterhouses are not centralized, and the small byproduct output of each may or may not be utilized in swine

feeding, depending upon whether the operator, or his neighbors, appreciates the feeding value of these materials. Nevertheless, the swine themselves can be found scavenging around such places, and here at least they make a somewhat speedier growth.

FIGURE 40. — Hogs on a farm in eastern Nicaragua.

The Tropics abound in insect life, and, among those pigs that are not confined, rather remarkable growth has been observed, despite all the dangers of infestation by internal parasites. Sows and their litters have been seen wandering far and wide around half a dozen city blocks, picking up insect life, foraging for various materials, etc. One of these litters, of eight pigs, was observed from soon after birth until an average weight of about 150 pounds was reached 8 months later.

Transportation to Market

Teachers of swine-production methods in the United States emphasize the importance of good feet and legs to enable the hog to reach market. In Nicaragua the pig really needs good underpinning, because he, unlike his United States cousin who rides, actually goes to market on foot. While one of the writers was traveling by car, a drove of swine numbering about 100 head were passed at 4:00 a.m. about 35 miles from Managua. These animals were being herded to Managua and in the heat of the day were allowed to rest so that the slaughter pens would be reached in the cool of the morning or late in the afternoon immediately preceding the night of slaughter.

Some herds may be several days and nights en route to market, traveling distances of 75 to 100 miles. The very heavy hogs lose much weight and do not stand up under such treatment. Thus, there are more light-weight animals (under 200 pounds live weight) in the market, though there is a preference for much heavier ones because of the greater lard yield. Until transportation and feeding improve, however, slaughter weights will probably continue as at present.

Diseases and Parasites

Hog cholera is known to exist in Nicaragua and offers a serious problem. Hog influenza has been reported, as have anthrax and hemorrghagic septicemia *(11)*. No doubt there are many other diseases, but they remain for a veterinarian to diagnose.

The large roundworm *(Ascaris lumbricoides)* of swine has been observed. It is particularly noticeable as soon as pigs are placed in confinement, but the effect of its presence is not so apparent when the pigs are allowed free range. Trichinosis has also been reported in hogs. One authority *(7)* has stated that of 1,241 pigs killed in one month at a local abattoir, 46, or 3.7 percent, showed the presence of

"Tenia Solium" cysts. Kidney worms have also been reported. Unquestionably, other parasites are also present, but they have not been determined.

Because of faulty feeding and management, hog losses are undoubtedly high, but a valid estimate of the total loss cannot be made.

SHEEP AND GOATS

Sheep and goats are relatively unimportant. Nicaragua is not a sheep country, and in most parts of the country sheep are regarded as curiosities rather than as animals having economic value. On the other hand, goats do offer a possibility as a source of milk and meat for the poorer people.

Sheep

Numbers

According to the 1938 census, there were 14,558 sheep (2,978 males and 11,580 females) in the country. The animals were not further classified as to type, age, castrates, etc. The Department of Masaya had the largest number, 6,386 head, followed by Matagalpa with 2,910 head, and Managua with 1,921. These three Departments, plus Carazo (for which no returns were made), are the principal coffee-producing areas of the country. Thus, the existence of more sheep in these Departments is believed to be associated with their value as producers of manure to be used on the coffee plantations. Some sheep are reported from each of the other Departments of the Republic.

The individual flocks are not large, some containing only 5 or 10 head. For instance, the 6,386 animals in Masaya comprise data from 621 farms, an average of slightly over 10 head per farm if each had sheep. Also, the 2,910 listed in Matagalpa are reported from 5,108 farms.

Types

For the most part, the sheep seem to be of an unimproved Merino type, no doubt descendants of original importations brought in by the early settlers. One flock of long-wooled sheep was observed. Upon inquiry, the owner, of English descent, confirmed the opinion that the animals were of Highland breeding. The "Merinos" have very ordinary fleeces, containing a mixture of wool and hair, the wool representing the skin side of the fleece. The clip is light, rarely exceeding 2.2 pounds, since the wool is lacking in yolk. Most people shear twice a year, but there are owners who do so only annually. Shearing but once a year does not add to the weight of the fleece, since, with increasing length, much wool is lost in one way or another, many partially bare sheep having been observed. Fleeces do not cover the belly.

The wool is not an article of commerce and, as has been mentioned, the chief value of the sheep lies in the use of the manure produced.

Goats

These animals are reported in all the Departments. The 1938 census listed 2,624 males and 2,708 females - a total of 5,332 goats. They are not further classified. The size of the flocks is small, judging by the number of farms reporting. Madriz, which has the greatest number of goats, is also an area of many small farms. Travel along the Pan American Highway confirms the fact that each small *campesino* usually has a goat or two. They provide meat and a certain small amount of milk for their owners, who otherwise would have no available supply.

The goats vary in color, are not large, and do not have good meat-producing forms. They are the usual run of the common goat.

POULTRY

The census of 1938 does not distinguish between the different kinds of fowl but lists a total of 1,009,490 birds of all classes. The Departments of Managua and Chinandega lead, each with over 11 percent of the total number reported. Matagalpa and Madriz each have over 9 percent. In general, this follows the figures for human population. (See fig. 41.)

Chickens

The general run of chickens in western Nicaragua more frequently than not resemble the game-bird type; they are varicolored, quite active, and good rangers. They have strong wings and can lift themselves to roosts at considerable distances from the ground.

As with other classes of livestock, the origin of these birds dates back to the days of the *conquistadores*. Through the years, and especially recently, new blood has been widely diffused through the poultry in Nicaragua.

Breed Improvement

Several improved breeds have been imported. The present Minister of Agriculture has brought in by air over 20,000 well-bred chicks from sources in the United States. When unrestricted air traffic is again resumed, these shipments will no doubt be renewed. White Rocks, Barred Rocks, White and Brown Leghorns, Reds, and others may all be seen in a relatively pure state. The effect of improved birds can already be seen throughout the country. Several kinds of Ornamentals are also evident.

A resident of Nicaragua, who lives on the Escondido River in the eastern part of the country, has developed an excellent red chicken which thrives in that heavy-rainfall area. Its appearance is somewhat similar to the Rhode Island Red, and, like this breed, it is a good layer and makes a good eating fowl. The owner claims that his birds have been selected and developed from native stock over many years. Possibly the Rhode Island Red may be a remote ancestor of this strain, inasmuch as the various fruit companies introduced improved breeds of most classes of livestock in the early days. In fact, up and down the Escondido River, heavier types of birds are much more in evidence than the prevalent game-chicken type in western Nicaragua. It is not known whether or not this is related to the fact that English is the main spoken language in eastern Nicaragua.

FIGURE 41. — Wherever there are people, poultry are found, mostly in small flocks. They follow lines of communication - rail, water, or roads. Chinandega and Managua have the greatest numbers followed by Madriz and Matagalpa.

There is hardly a family in rural areas that does not have some poultry - and even in the larger towns and cities numerous households attempt to supply the family table by means of several hens. The night-crowing rooster is always present. Many of these roosters are of the "game" type, some being proud veterans of numerous battles of the ring and so are especially well cared for and highly valued. Flocks vary in size from a pen of one cock and three hens, kept in the patio of the home, to a larger number running loose around the small home of the rural dweller, or confined within poultry netting, as is frequently the case when they are the property of a larger landowner. Some of these larger flocks may number 200 birds, and they most frequently show evidences of improved breeds. Rarely are these larger flocks of a single color or type. They often resemble the old-time mixed barnyard flocks of the United States.

Eggs

How will you have your eggs? For those who can afford them, eggs constitute one of the staples of diet for breakfast and frequently for another meal during the day. This is particularly true when they are plentiful, but even in the so-called off season, eggs are usually available for breakfast at the hotels throughout the country and for those who have the price to pay for them.

Refrigeration and marketing grades for eggs are nonexistent in Nicaragua, but, if friendly with the venders, one obtains four or six new eggs for a similar number of bad ones in the dozen purchased previously. The 1944 consumer prices for eggs in Managua varied from 15 centavos (3 cents) each in the surplus season, to 20 centavos (4 cents) each in the off season. For the country as a whole, the price of eggs has increased from 1.7 centavos each in 1937 to 10.4 centavos in 1943, or an increase of over 510 percent *(14)*.

Sometimes eggs are transported great distances to market. Individually packed in a corn-shuck wrapping, or in a special cradle of dried banana, or other broad, leaves, they come down the rivers by dugout canoe, by rail, or by pack animal to the highways and finish their trip by truck. If produced closer to town, they arrive without protection in a large shallow basket atop the head of one of the market women. Frequently in the past, eggs have been an important item of export, principally to Peru. Live chickens are also exported, mainly to Panama.

Accurate figures on egg production could not be secured. However, several black native hens of the prevalent game type were obtained by one of the writers as pets for his two boys. In an endeavor to see what they would produce under the usual way of feeding household flocks where grains, but not protein supplements, are available, they were given some corn augmented by a few table scraps. Each of these in turn started laying brown eggs that were between 1½ and 2 ounces in weight. In a period of 3 weeks, each laid about 15 eggs and then became broody. Finally, broken of the desire to set, each in turn resumed laying after about a month and again became broody. Though the diet was not satisfactory, it was similar to that given such birds. This too-brief experience with unselected birds is the basis for the belief that the general run of hens in Nicaragua produce from 50 to 75 eggs per year. On the other hand, in a White Rock flock, maintained under controlled conditions and with good feeding and management, an egg production of over 150 eggs per hen per year was obtained.

Turkeys and Ducks

Turkeys are plentiful. As nearly as can be determined on the basis of color, they are the Bronze and Narraganset kinds. The native wild Nicaraguan turkey, which

can still be found where the forest growth is heavy, is a smaller, completely black bird. Incidentally, it is as tough as shoe leather after cooking.

The ducks are usually of the Muscovy breed, for Central America (Honduras) is the original home of this breed. They are more numerous than turkeys. Frequently one may see a white duck similar to the White Pekin. Geese are less abundant than ducks. When found, they are usually in pairs around the homesteads and, for the most part, are similar to the Toulouse breed.

FIGURE 42. — Turkeys may be driven to market.

Poultry Management

No concerted effort is made to raise poultry in the manner in which they are produced in the United States. For the most part they, too, are foragers and live on kitchen wastes of rice and corn. The protein supplement they obtain is more often than not in the form of ants, cockroaches, and other insect life. In the midst of a heavy rain, it is not unusual to see a hen hunting for the insects that emerge from the ground.

In spite of this treatment, a good percentage of the locally hatched "criollo" chicks live to maturity. While mortality is believed to be high under these "natural" conditions, no figures are available to indicate its level. However, where even a modicum of care is bestowed, there is no great loss, and the raising of poultry can be made profitable. In fact, at the ranch on the Escondido River previously mentioned, chicks are hatched under a hen, and the mortality is no greater than that under similar conditions in the United States. Growth, too, seems satisfactory.

Similar observations have been made up and down the river at the homes of several of the small farmers who are also raising red birds. For this reason, this particular strain is believed, through natural means, to have acquired some sort of resistance to conditions; or else, because of the wide ranging of these birds, the incidence of infection is somewhat controlled.

Among the imported chicks and confined birds, mortality is high, probably resulting from lack of resistance to local conditions, malnutrition, and coccidiosis and other diseases that occur in confinement in small areas without proper attention to feeding and management.

Among the diseases reported in poultry are *morrina* (a term applied to most any sickness but probably a form of influenza), *coriza* (probably catarrh of fowls), avian cholera, and *viruela* or fowl pox *(2, p. 60)*.

FINANCIAL ASSISTANCE TO STOCKMEN[12]

Acquisition of Land

Most of the land not now in use belongs to the Government, and parcels may pass to private hands at low prices by auction methods as provided under the Agrarian Laws. Land titles are then issued to the new owner and deposited with notaries. Estimates indicate that public lands account for at least 15,000,000 acres of Nicaragua's area *(17)*.

Credit

Credit is extended to stockmen through the National Bank and its subsidiary, the Mortgage Bank. The latter makes loans that may run from 5 to 20 years at interest rates lower than generally available. The maximum allowable is 7 percent, though usually the rate is 6 percent. Other charges in obtaining loans are 1 percent for commission (reserves and expenses) and 2 percent for annual amortization.

In 1942 there were 594 livestock loans totaling C$3,310,954 or averaging C$5,574 each. These constituted approximately 43 percent of total rural loans for the year. In 1943, when the effect of World War II became more pronounced, the number of such loans was considerably reduced. In that year there were only 35 livestock loans totaling C$282,000, which also amounted to about 43 percent of all agricultural loans. In 1942 a little more than 29 percent of the livestock loans were for sums in excess of C$5,000, whereas in 1943 there were a little better than 65 percent of the loans in the same classes.

MARKETING MEAT ANIMALS AND MEAT

Though Nicaragua has no packing industry, little is lost when an animal is killed. Frequently the blood is saved and made into a blood pudding. A common sight is a youngster carrying home the lungs of some slaughtered animal, and the people consider tripe quite a delicacy. Some of the poorer classes use bits of the intestine in soups, etc. Indeed, a *pièce de resistance* is *chicharrón* or cooked pigskin. This is frequently sold over the counter day and night, and people may be seen walkung along the street eating it. The skin is cut with considerable portions of the underlying fat attached. The lard is then rendered from these pieces of fat skin, and they are then termed *chicharrones*.

A certain small amount of sausage is made from both beef and pork. The cured meats available are usually imported products, since hams and bacon are not commonly prepared in the country. Nevertheless, one restaurant owner in Managua cures his own ham and bacon and, for a price, will do so for others.

Slaughtering usually takes place from about 10 p.m. to 2 a.m., and the carcasses are allowed to cool until daybreak (between 4 and 5 a.m.), when they are loaded into two-wheeled, covered carts and taken to the vending stalls in the various markets. Here the meat is put in a pile, or hung on hooks in small booths, sometimes screened but frequently not. After 9 a.m. it is almost impossible to purchase a day's supply of beef.

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[12] Based on information obtained from personal inquiries, reports of the U. S. commercial attache at Managua, and various publications *(16, 17, 19)*.

Meat Inspection

Plans have been drawn up and approved for a modern slaughterhouse to be erected near Managua. The *Distrito Nacional* has also started the construction of a modern butcher shop that will compare favorably with anything in the United States. The sanitary code requires slaughterhouses to fulfill certain sanitary regulations, and the Health Department makes inspections of the abattoirs used. Also, the Ministry of Agriculture has a livestock inspector in the capital of each Department (or State) of the Republic, who check brands, etc., and condemns meat from sick animals or those that die a natural death *(1, p. 54)*. These inspectors are graduates of the local school of agriculture and have specialized in the veterinary course, and many have become proficient in the services rendered. Most of them are young men, who, realizing their shortcomings, are eager to improve themselves. Some have expressed a desire to have an opportunity to come to the United States for further training. Officials in Nicaragua appreciate the fact that a graduate veterinarian should head up this service. The inspectors perform duties similar to those of veterinarians in the U. S. Bureau of Animal Industry. Their ability to enforce the regulations is, however, much less than that of their counterparts in the United States. In addition to the meat-inspection duties for which they are paid by the Government, the professional services of these young men are available to the local livestock men of their districts. Such service is considered as private practice through which the veterinarian may add to his income. Each rancher, however, makes a practice of vaccinating his own animals with biologics purchased from the Ministry of Agriculture. Thus, the income of the veterinarian is reduced.

Cattle Sold for Domestic Slaughter

In general, strictly slaughter animals (excluding work animals) are 5 to 6 years of age when marketed. Nevertheless, when pastures are available the year round, ranchers can turn off their surplus at a younger age. For instance, in the highlands behind Matagalpa a not-uncommon occurrence is to find 2- to 3-year-old animals at the slaughterhouses. These carcasses are said to dress out at from 300 to 400 pounds each and are thus almost as heavy as the weights indicated below for the older export steers.

In Nicaragua, as in the United States, cattle may be marketed directly or through dealers. Some dealers may simply buy the animals in one part of the country and drive them to another part for immediate sale and

FIGURE 43. — Typical small ranch scene.

FIGURE 44. — Where available streams are the main source of water in the dry season.

slaughter. Others, who may have good fattening paddocks, make a business of buying cattle from small producers who are not able to carry the animals through the dry season. During 1943 and 1944 these feeder cattle were purchased at from C$50 ($10 U. S. currency) to C$80 ($16) per head, depending upon size and condition. After about 3 months or more of grass fattening, some, destined for export, may be sold for as high as C$150, though the usual sale price is around C$100.

Number Slaughtered

Accurate figures for the number of cattle slaughtered throughout the country are not available, because returns from the abbatoirs are incomplete. In addition, no information is available on those animals slaughtered on farms or in isolated communities. As an indication of actual slaughterings, the following figures are taken for certain years *(14)*: 1937 - 66,155 head; 1940 - 63,954 head; 1942 - 71,264 head; 1943 - 79,755 head. Managua, the capital city, reported 20,940 head of cattle slaughtered in 1944. Movement of cattle to market is usually heavier during October through March than during April through September. Possibly this is related to the fact that feed is abundant during the latter months and producers are loath to sell animals while they are making gains. On the other hand, as the feed supply decreases with the advance of the dry season the disposition of market animals becomes imperative.

Prices

Live-cattle prices have been increasing since 1935. In 1943 grass-fattened animals sold for 8 cents per kilo ($0.0363 per pound), live weight. By the end of 1944 this had reached $0.10 per kilo ($0.054 per pound). To a great extent, these prices have been closely related to the demand for, and prices paid for, export cattle.

Taxes

Throughout Nicaragua, as is also true in other Latin American and some European countries, taxes are assessed on slaughter animals. These assessments are municipal and Federal in nature, but the portion paid to the Federal Government is small compared to that imposed by the municipalities. They are as follows - the Federal slaughter tax, the Federal stamp tax, and the municipal slaughter tax. The first two are set at C$1.80 (36 cents U. S.) and C$0.15 (3 cents), respectively, but the local taxes vary in amount and with the size of the center from 40 cents to over $1.30. Almost all the cities that use electricity use the slaughter tax to purchase electric wire, and some towns have increased the tax in order to help carry the generally heavy debt. There is a movement under way, however, to reduce these head taxes.

Cattle Exported

During the war years, the number of cattle exported reached 15,000 in 1943 and nearly 13,000 in 1944. The price of grass-fattened animals at shipside in Corinto, in San Juan del Sur, ranged from C$75 to C$150 ($15 to $30) per head. (See table 3.)

A 1943 shipment of these export cattle averaged 378 kilos (about 832 pounds), live weight, and quite probably this weight is typical of such animals. Prices have more than doubled in the past 5 years as a result of the demand for meat in the Canal Zone. The lower prices (table 3) are believed to represent more nearly the value of cattle as received by the stockmen. By the time the cattle reach their destination, freight and other charges may double the shipside price.

The animals are usually transported to neighboring countries in coastwise vessels with a capacity of from 100 to 200 head. A trained crew travels with all export cattle, and reports state that they arrive at destination in good condition, with not more than 10 percent loss in weight. Once in a while there may be some deaths, but they are unusual. These beasts are sold with the expectation that carcasses will have a dressed weight of about 400 or 450 pounds.

Of interest is the fact that Nicaraguan brands have been seen as far north as northern Mexico. Such animals have probably walked most of this distance through the course of many months. This movement of cattle has considerable economic importance to all the Americas. With the opening of the Pan American Highway, cattle shipments in both directions will be facilitated, and the animals will be accompanied by their diseases and parasites. The development of adequate veterinary service throughout the countries of Central America is imperative in order to study and combat parasites and diseases and to maintain free from disease an area that at present constitutes a "zone of protection" for the United States livestock industry.

In 1932 Costa Rica, until that time Nicaragua's best customer, placed an import tax on slaughter cattle. To counteract this and to provide an incentive for increasing local supplies, an export tax was placed on all animals leaving Nicaragua, regardless of destination. This worked a hardship on both producer and consumer and materially affected the growing export business, which did not continue at its previous high level. Recently the export tax was rescinded, and with its removal cattle are again being sent to Costa Rica, 9,825 head having been shipped in 1943 and 8,095 in the first 8 months of 1944 (table 3).

FIGURE 45. — The steers come by rail to shipside and are transferred in slings.

Swine Sold for Slaughter

Hogs are usually marketed through dealers who add to the size of their droves as they approach the market. These droves may contain animals of all ages and sexes and in varying condition of flesh. Because

TABLE 3.—*Exports of cattle from Nicaragua, number and value, by country of destination, 1916-44*

PERIOD	EXPORTS		DESTINATION			
	HEAD	VALUE PER HEAD	COSTA RICA	HONDURAS	PANAMA	PERU
	Number	*Dollars*	*Number*	*Number*	*Number*	*Number*
Average:						
1916-20	7,727	-	7,727	-	-	-
1921-25	11,730	-	11,730	-	-	-
1926-30	15,608	-	15,608	-	-	-
1931-35	8,377	-	8,377	[1]554	-	-
Annual:						
1936	15,496	-	14,565	931	-	-
1937	-	-	-	-	-	-
1938	5,841	12.06	-	-	-	5,841
1939	13,384	13.94	-	-	-	13,384
1940	5,681	14.47	-	-	-	5,681
1941	6,877	15.95	-	-	-	6,877
1942	1,465	24.11	-	-	1,465	-
1943	15,425	26.46	9,825	-	5,600	-
1944	10,270	38.00	[2]8,095	-	2,175	-

[1] 1935 only; not included in average of total.

[2] January-August only.

MEMORIA SOBRE LA INDUSTRIA GANADERIA Y SUS ANEXOS *(3)* and information from Customs Service of the Republic of Nicaragua *(16)*.

lard is at a premium, no swine are exported. As with cattle, prices paid for live hogs have increased during the past 10 years. No standard price can be quoted on swine.

Most of the hogs are purchased in quantities of one to three or more from the individual producer and, as is often true on such occasions, the price paid is usually arrived at after much "dickering." Inquiry has revealed that these prices may range from $8 to $20, depending upon the size and condition of the individual animal.

Data taken from reports of public slaughterhouses on the basis of the payment of the head tax give some indication of the hog slaughter for certain years. The figures, which are not complete, are as follows: 1937 - 60,898 head; 1940 - 56,674; 1942 - 71,084; 1943 - 71,835.

The movement of hogs to market is rather regular throughout the year, but there is some indication that fewer animals are marketed during the months of July through September. The relationship of this decline to the hog crop is not known.

DOMESTIC CONSUMPTION OF MEAT

Sufficient data are not available to make possible a reasonably safe estimate of per capita meat consumption in Nicaragua. In the diet of those who can afford it, the total consumption of meat (all classes) must approach or exceed that of the United States, because meat is frequently served several times a day. The great majority of the people, however, though lovers of meat, do not consume as much as they desire.

In rural areas the killing of an animal is an event, and the meat is shared with neighbors as in the early days in the United States. To put a chicken in the pot is as easy in Nicaragua as in this country, and frequently chicken may be the meat course for unexpected company when families lack refrigeration.

According to figures presented by Cabrales *(3)*, the per capita beef consumption has materially declined with the years. He states that Levy, an early historian, estimated that in 1871 the consumption of beef averaged 160 pounds per person. (See table 4 for figures computed by various persons on the basis of available data.)

TABLE 4. – *Estimated annual per capita consumption of beef in Nicaragua, specified years*

YEAR	POPULATION[1]	CATTLE SLAUGHTERED[2]	ESTIMATED PER CAPITA CONSUMPTION[3]
	Number	*Head*	*Pounds*
1871	[4]505,377	-	[5]160
1907	- - - - do - -	-	[6]52
1908	- - - - do - -	60,982	[6]48
1909	- - - - do - -	68,242	[6]54
1910	- - - - do - -	59,087	[6]46
1912	- - - - do - -	-	[6]46
1932	[7]638,000	41,529	[6]26
1933	- - - - do - -	41,266	[6]25
1934	- - - - do - -	46,398	[6]29
1935	- - - - do - -	48,019	[6]30
1936	- - - - do - -	51,131	[6]32
1937	[8]860,000	66,155	[9]31.1
1940	899,048	63,954	[9]28.4
1942	1,030,000	71,264	[9]27.7
1943	1,048,642	79,755	[9]30.4

[1] From figures given in ESTADÍSTICO GENERAL *(14)*.

[2] Based on reported head tax collected each year.

[3] Calculated on basis of an average carcass weight of 400 lbs. and population as shown for each year.

[4] 1906 census.

[5] Estimate by Levy *(3)*.

[6] Estimate by Cabrales *(3)*.

[7] 1920 census.

[8] Estimated population.

[9] Estimate by the authors.

At least three errors enter into the figures given by Cabrales: (1) Population is not static; (2) unreported slaughterings were not taken into consideration; (3) scales are not common and the average carcass weight may not be 400 pounds. The authors estimated the probable changes in population but were unable to arrive at figures for unreported slaughter and a more accurate average carcass weight.

In Nicaragua, as in other countries, the economic position of the people is important in any listing of food consumption. On the assumption that Managua, the capital city, represents a cross section of a higher plane of living, the following calculation of meat eaten may be of interest. These estimates of the use of beef and pork have been made for the year 1944 on the basis of the municipal slaughter-tax collections and population of 125,582 persons on April 30, 1944.

Animals slaughtered	Head	Estimated carcass weight	Total weight	Estimated per capita consumption
	Number	*Pounds*	*Pounds*	*Pounds*
Cattle	20,940	400	8,376,000	66.7
Hogs	20,688	100	2,068,800	16.4

Apparently, in Managua, at least, the use of beef is similar to that in the United States, whereas that of pork is much less. The combined figures indicate an average per capita consumption of slightly more than 83 pounds in 1944.

In the country as a whole the consumption of pork is estimated to be considerably below that of the capital city. On the basis of available data, the average annual per capita pork consumption in Nicaragua during the years 1937-44 is estimated to range between 6 and 7 pounds.

No data could be assembled on the consumption of meat from sheep and goats, but such cuts may be purchased on the markets of the larger cities. The belief is, however, that the per capita consumption of sheep and goat meat is much lower than that of pork. Poultry is common in the diet, but actual data similarly are lacking. Because poultry is so widely used, the consumption of this kind of meat probably approaches that of pork.

Retail Prices

Retail meat prices in 1943 and 1944 were considerably higher than in prewar years. The National Board of Price Control has attempted to set ceilings on various cuts of meat in order to keep living costs in proportion to wages, which are still quite low. In Managua in 1944, the established price of beef soupbones was about 5 cents per pound. A 3-pound tongue could be bought for 60 cents. The best cuts - loins, etc., could be purchased at 30 cents a pound. However, in Nicaragua as in the United States, the black market flourishes, and the purchaser is even more at the mercy of the vender. On occasion, in order to buy just any kind of meat, one must pay substantially more than established prices. With export cattle increasing in value, there has been a corresponding rise in the retail price of all meat. (See table 5.)

Cuts and Quality

How do you want your meat today? There are no charted cuts in Nicaragua, and few bones are lost, because they make good soup for the meat-hungry people. Steaks, chops, and such standard cuts are not the custom. Rather it is a strip or chunk of this or that from which the steak is finally prepared. All meat is "fresh" and, because of the lack of proper refrigeration, must all be sold soon after slaughter.

TABLE 5. – *Average prices*[1] *of specified meat cuts, lard, and live poultry in Nicaragua, 1937–43*

MEAT	CUT	UNIT	1937	1938	1939	1940	1941	1942	1943
			Centavos	*Centavos*	*Centavos*	*Centavos*	*Centavos*	*Centavos*	*Centavos*
Beef . .	*Lomo* (loin).	Pound. .	11.0	16.2	21.7	28.6	30.8	30.2	42.1
	Posta[2] . . .	- do - -	18.6	12.9	17.8	22.2	23.1	23.3	31.0
	Hueso (bone)	- do - -	5.6	8.0	10.9	14.5	13.0	13.5	19.9
Pork . .	*Lomo* (loin).	- do - -	12.0	18.6	28.1	37.6	39.2	42.1	65.9
	Lard	Bottle[3].	32.0	55.9	101.2	99.5	76.2	144.5	189.2
Poultry.	Live hens. .	Fowl . .	40.0	71.0	91.5	100.5	116.9	149.5	235.2

[1] The centavo was worth about 0.675 cent (U. S.) in 1937, 0.22 in 1938, and from August 1939 through 1943 it averaged about 0.20 cent.

[2] Other than back meat; probably round and shoulder cuts.

[3] Because of being in fluid state, lard is sold in 3/4-liter (about 3/4-quart) bottles.

ANUARIO ESTADÍSTICO *(14)*.

Certain of the better markets may offer meat from grass-fattened cattle. The usual carcass is from work oxen or cows that have outlived their usefulness. The choicest animals are usually sold for export, because they bring a higher price when sold for this purpose. Since the consumption demand is for meat, the sex of the animal killed is not considered important. All pork cuts are usually closely trimmed because of the scarcity of lard. Owing to the great variation in the size of the animals slaughtered, sizes of pork cuts are not uniform. In general, the quality of meat is lower than that usually available in the United States.

BYPRODUCTS OF LIVESTOCK

Hides and Leather

In the early days, cattle were valued chiefly for the hides and tallow they produced. The hides were not tanned but were shipped in the crude, probably salted, state. No hides have been weighed by the writers, but estimates are made that the wet salted hides run about 35 pounds each, and the dried ones at about 25 pounds each.

Estimates have been made that 65 percent of the domestic tanned leather is used locally and that the remainder enters into export trade.[13] Some trade in raw salted hides also takes place (table 6).

For the most part, these hides are reported to be considered third grade as an article of commerce. This is due as much to the great damage caused by the *tórsalo (Dermatobia hominis)* warble as it is to fire branding, careless skinning, and the method used in preparing and curing the hides. In spite of these defects, much progress in the Nicaragua hide industry would result if everyone took the proper precautions that a few people are now taking in skinning and curing.

[13] BERENGUER, A. THE NICARAGUAN MARKET FOR LEATHER AND LEATHER GOODS - DECEMBER 1944. U. S. Cons. Rpt. No. 190, 12 pp. Managua. December 21, 1944. [Hectographed.]

TABLE 6. – *Exports of tanned and raw hides from Nicaragua, specified years*

YEAR	TANNED HIDES	RAW HIDES		YEAR	TANNED HIDES	RAW HIDES	
		QUANTITY	PERCENTAGE OF TOTAL EXPORTS, VALUE BASIS			QUANTITY	PERCENTAGE OF TOTAL EXPORTS, VALUE BASIS
	1,000 lbs.	*1,000 lbs.*	*Percent*		*1,000 lbs.*	*1,000 lbs.*	*Percent*
1896 . .	-	[1]1,511	-	1933 . .	28.1	130	1
1921 . .	8.7	556	-	1934 . .	.6	194	1
1922 . .	-	824	-	1935 . .	17.5	105	1
1923 . .	1.4	745	-	1936 . .	4.6	289	2
1924 . .	7.1	652	-	1937 . .	-	359	3
1925 . .	2.6	693	2	1938 . .	-	414	2
1926 . .	2.3	467	1	1939 . .	-	243	1
1927 . .	7.9	744	2	1940 . .	-	-	-
1928 . .	2.6	1,077	2	1941 . .	-	158	1
1930 . .	-	614	1	1942 . .	-	66	-
1931 . .	-	465	1	1943 . .	-	390	-
1932 . .	18.2	143	-	1944 . .	-	[2]198	-

[1] NIEDERLEIN, GUSTAVO. THE STATE OF NICARAGUA OF THE GREATER REPUBLIC OF CENTRAL AMERICA *(15)*.

[2] Value estimated at $130,000; see SMITH, JULE B. ANNUAL ECONOMIC REVIEW - NICARAGUA, 1944. U. S. Cons. Rpt. No. 43, 42 pp., illus. Managua. March 3, 1945. /Hectographed./

Compiled from Nicaraguan Customs Reports *(16)* and U. S. Tariff Commission *(18)*, except as noted.

Nicaragua, being a tropical country, possesses many natural materials that could be used in the tanning process, but skilled leather craftsmen are few in number. Various "old timers" have stated that in the early days of the country tanning and leather work was an art. The succeeding generations have failed to take up the craft, however; so the industry has suffered.

At present, 285 tanneries of various capacities are known to be producing leather, working a total of about 65,000 hides a year. Of these, 200 plants process 2 to 3 hides per week, which for the most part are made into sole leather. Actually, reported slaughterings should increase the number of hides noted above. Tanning methods are primitive and make use of the many local materials, such as the crude bark of mangrove, hawthorne, and divi-divi *(Caesalpina coriaria)*. Nevertheless, about 5 percent of the plants use the chrome-salts process in tanning leather.

Practically all sole leather in the locally made shoes is of domestic origin. For the most part, imported leather is used in the uppers of locally made shoes for the better class.[14]

Tallow

Panama was long the receiver of most of the tallow exported from Nicaragua. As early as 1665 this article of commerce was taxed 1 peso per "zurron" (probably about 25 pounds) to provide funds for the defense of the San Juan River, gateway to inland Central America, against the wide-roaming pirates of the times.

The yield of tallow has been estimated at about 3 arrobas (75 pounds) per head. For some time the local production has not nearly filled the great demand for this

[14] BERENGUER, A. HIDES AND SKINS - NICARAGUA, NOVEMBER 1944. U. S. Cons. Rpt. No. 165, 12 pp., illus. Managua. November 6, 1944. /Hectographed./

product, chiefly because of the growth of the soap industry. Thus, the country is now on an import basis. Up to 1932, the customs reports listed some export of this material, but during the 6 years 1931-36, inclusive, imports averaged over 896,000 pounds per year.

Other Byproducts

With such rich soil where most of the crops are produced, there has been no need to depend upon fertilizer to ensure crop production. Thus, the various slaughterhouse wastes have not been utilized, except horns, which are used as button material. Trade records also show occasional exports of horns, but the items are never large enough to be important. In recent years, the United States has been the chief customer for this export, receiving in 1941 approximately 20,000 pounds *(16)*, but such shipments have been irregular.

PROSPECTS FOR DEVELOPMENT OF INDUSTRY

The future of the livestock industry in Nicaragua is a big question and still needs much study. The writers of this report believe, however, that Nicaragua, as the Texas of Central America, has a livestock future and will grow of its own volition. Great opportunities for expansion exist, providing certain courses are followed. Already attention is being given to producing a better quality beef from animals selected for this purpose. Some worth-while efforts are being made to differentiate between dairying and beef production, with dairying located around the centers of population, or at points that will be reasonably accessible as transportation improves. The country may even be considered as a source of draft oxen for areas lacking such animals.

The expansion which is already taking place has created an unfilled demand for dairy and beef bulls. Estimates based on information received from inquiries indicate that at least 100 bulls of both types presently could be sold into Nicaragua. Satisfactory sales will mean a repeat business in future years.

Improvements are being effected in dairy sanitation. Machine milking is a topic of conversation, because already farm labor is becoming a problem, both from the standpoint of supply and of cost. With the continued growth of the cities, the establishment of other milk centrals will take place; and, as the foreign-trained young men return to take charge of these plants, they will put into practice as

FIGURE 46. — A farm on the Escondido River producing dairy products, rice, cacao, and meat.

FIGURE 47. — New land being cleared for pasture.

much as they can of their newly acquired knowledge in processing milk into butter, cheese, etc. This improvement in the dairy industry will certainly lead to demands for foreign-made dairy equipment of all types, as well as dairy chemicals, cleansers, etc.

Nicaragua needs more silos. They have already proved their value, but their wider use throughout the whole of western Nicaragua will do much to ensure a feed supply in the long dry season. Crops other than corn must be developed for use in the silo. For the second year there has been a drought, which is reflected in empty or half-filled silos. Increased use must be made of the grain and forage sorghums, because these plants survive when corn is affected by an unexpected cessation of rains and the dry season. Improved varieties of sorghum have already been introduced successfully through the auspices of the Agricultural Experiment Station. Seeds of improved forages and legumes are already in demand.

Programs of pasture improvement and management need to be set up that will give the maximum-area return of meat or milk so that production costs can be kept low. Legumes need to be included among the forages. Several valuable protein-rich plants are available for such purposes. The production of a hay crop is justified and necessary to augment the silo. Though at present some Pará-grass hay is occasionally fed, Rhodes grass would appear to offer greater possibilities in the drier regions. Thus, both silage and hay production will need modern farm machinery if a desirable product is to be made. Local implement dealers are anticipating these demands and anxious for the resumption of normal trade. Wherever possible, if the type of grass does not preclude its use, the mowing machine should be imported and utilized. It would be particularly valuable in a pasture-management program, since the surplus feed could be clipped and placed in the silo. From the standpoint of hay production, a mowing machine, or a scythe, is essential. Other pasture tools will also be needed.

More livestock men will follow the practice of the better farmers in keeping records of production and cost accounts. In this way, the farming enterprise can be put on a businesslike basis.

Transportation will improve in Nicaragua. The people are awake to the importance of good roads. Already many new bridges are under construction, and towns not on the new Pan American Highway are besieging the Government for assistance in getting out of the mud. These requests are being granted. With good roads extending to all parts of the country, all livestock products can be sent to market by truck. This will save time and preserve quality and flesh. Conversely, stock can be moved to green pastures

when drought hits the western areas; thus, a constant, adequate supply of livestock products can be furnished to the hungry people. Incidentally, a greater use of the truck in livestock husbandry will necessitate increased imports of these machines.

Need for Training and Education

One of the pressing needs of Nicaraguan agriculture is trained supervisory labor - the foreman class. The usual practice is to pay the finca manager a wage only slightly superior to that for general labor, and in fact, just about what it is worth. Some livestock owners in Nicaragua have, however, already expressed appreciation of the fact that there are few of the farm-manager type of persons upon whom they can depend to run an enterprise intelligently. These owners realize the importance of having keen, intelligent, wide-awake operators in charge of their units - also, that they must be well paid. Fortunately, with the inauguration of Dr. Popenoe's school - Escuela Agrícola Panamericana - in Honduras, this type of trained personnel may soon be available, since at least eight Nicaraguan youths are in attendance there.

Then, too, in the rural schools throughout the country, the young people must be made familiar with agriculture as a part of their education. The establishment of a system of vocational education is under way. Finally, a system of agricultural extension to reach all the people is constantly foremost in the mind of the Minister of Agriculture. Progress in all these educational lines has already started.

With the establishment of the Agricultural Experiment Station at El Recreo, and with the growth of the National School of Agriculture at Chinandega, scientific investigations into the problems of veterinary and animal sciences will be made. These are necessary for progress in the field. For a considerable number of years Nicaragua will no doubt need all the technical assistance the United States can provide in guiding the developing programs along lines making maximum use of local materials. Too frequently the thought is expressed - "after the war when we can import cattle." The firm belief of the authors is that the best solution of the livestock problem is to cull, select, and grade up the valuable material now available in order to retain the maximum of natural resistance, except in those climatic regions where stock from the north have demonstrated their ability to thrive.

FIGURE 48. — Living fence posts are common throughout the country.

The problem of livestock pests and diseases is not one that offers easy solution. Several young Nicaraguans are now attending schools of veterinary medicine in the United States. Upon their

return, they will no doubt be put to work in some official capacity, to subsidize them, but will be permitted to make charges when called by the stockmen. This practice has worked successfully elsewhere. However, they will need adequate laboratory facilities in some central place to meet the many problems of the local stockmen.

FIGURE 49. — Getting water for the household is fun for the children.

The problem of the "*tórsalo*," *Dermatobia hominis*, is most pressing. Because of the intermediate host involved, a considerable control problem is presented. Great is the damage to the hides by the larvae of this fly. Perhaps the increased use of rotenone dusts, sprays, and dips may be a factor in controlling this pest. Nicaragua now is producing this insecticidal material in a small way; so there is no reason why each stockman could not have his own supply and all cooperate in a clean-up campaign. Working together in an area-wide dipping program might sufficiently reduce the fly population so that it would cause less damage than at present. For the most effective treatment, powerful spray machines are essential.[15]

Possible Competition with the United States

The United States livestock producer will have nothing to fear from his counterpart in Nicaragua for many, many years, if the Nicaraguan populace is to be placed on an adequate nutritional level. The dairyman can look to his local market, which has potentialities for absorbing many times its present small per capita consumption of milk and milk products as reported by Dahlberg and Hodgson.[16] Similarly, as the nutritional and living standards of the people continue to improve, they will demand more meat and its products, and fewer animals will enter into the export trade. Such diet changes are made only over long periods of time and as economic conditions permit. As living conditions improve, the end effect should actually be to the benefit of the United States as a whole through the demand for its products.

In general, the development of the Nicaraguan livestock industry should create a need for farm and ranch machinery and equipment, slaughterhouse requirements, dairy supplies and equipment, breeding stock, agricultural seeds, and animal biological supplies; and the United States should receive a large part of this business.

Fundamentally, any expansion is dependent upon the economic situation. During the war years demand and prices have encouraged livestock ventures, but these conditions may not continue and will not unless the general buying power increases.

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[15] U. S. BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE AND BUREAU OF ANIMAL INDUSTRY. PREPARATION AND USE OF DUSTS, SPRAYS, WASHES, AND DIPS CONTAINING ROTENONE FOR THE DESTRUCTION OF CATTLE GRUBS. U. S. Bur. Ent. and Plant Quar. and U. S. Bur. Anim. Indus. E. 623, 5 pp. August 1944.

[16] See reference cited in footnote 7, p. 23.

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